

# FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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## EDITORIAL COMMENT.

**A** PROPOS the destruction of "L. 22" recently by "our Naval forces," the *Daily Mail* recently published a strongly-worded leading article on the need for more seaplanes and a more forward policy on the part of the Admiralty. It is perfectly true, as our contemporary points out, that until very recently: "Owing to the German Staff's foresight and the Sea Lords' want of imagination the enemy could watch what the British admirals were doing, raid the British coast, and escape destruction. His airships were everywhere, while British fighting admirals complained that for want of aircraft they were paralysed. They were, in fact, in the position of a blind man fencing with an opponent in full possession of his sight."

### The Aerial Policy of the Navy.

The *Mail* then goes on to say that the German Admiralty knows the importance of commanding or controlling the air. Now it finds the Zeppelin is becoming useless for war it will set out to build seaplanes and copy our methods. No German, says our contemporary, ever invented anything, but the Germans are the most patient and industrious

of imitators. They are never ashamed of stealing our discoveries. We may be certain that they will set to work to produce powerful and formidable machines, and our Admiralty will be wise to prepare for such a competition in sea-going aircraft as is now in progress in land aeroplanes. It is of the most extreme importance that the Air Lord of the Admiralty should have a free hand and all possible support.

We agree with all this. In fact, we feel quite as strongly as the *Mail* that it is absolutely necessary for us to secure and maintain the supremacy of the air above the sea as we have, we hope and believe, secured that over the land. At the same time, however, we have something of a feeling of regret that the *Mail* has thought it necessary to go out of its way to throw doubt by implication upon the present administration of the Naval Air Service. Undoubtedly the man in the street as he reads the *Mail's* article will end it with the feeling that once again there is a screw loose at the Admiralty. Particularly must that be so when he regards the past history of the Service. He will have it in his mind that not once but two or three times since the beginning of the war has it been found necessary to "re-organise" the Air Department of the Admiralty, and he cannot be blamed for the conclusion that once more there is foreshadowed more of the same sort of thing. Admitting, as we have, that all the *Mail* says about the past, and the want of foresight displayed by successive Boards of Admiralty before—and since—the war, we still deprecate the tone of what we have called casting doubt by implication. Either the present administration of the R.N.A.S. is alive to the needs of the situation, present and future, or it is not. If it is not and we know it, then let it be said right out and we will join our contemporary with pleasure in a campaign for getting rid of the slackers and incompetents. But so far as we know, the new administration is particularly alive to both present and future, and there is no reason at all for getting into a panic about things. If, for example, the French reports which purport to give details of the destruction of "L. 22" are anywhere near the truth, they should assist in reassuring the public that a spirit of greater liveliness and aggressiveness has already been infused into the conduct of the aerial war over the sea. Those reports tell us that the Zeppelin was destroyed by British seaplanes—and not so very far from her own coast, either, which indicates



that the Navy is taking very active measures at last to drive the enemy's aircraft out of the war zone of the North Sea. In addition to this one example of greater aggressiveness, we are told by the official reports that seaplanes have been doing a great deal of more than useful work in the campaign against the enemy's submarines, which again is an outward sign of inward health. We would not argue that all has been done that is necessary even to meet the needs of the present, let alone the future, but we do think that with the present Fifth Sea Lord at its head the Naval Air Service is forging ahead at a rate which has left previous records well behind. Further than that, we know that Commodore Paine is an officer with all the imagination necessary for realising what the demands of the future are likely to be, and with tenacity of purpose enough to see that he gets what he wants. In a word, the R.N.A.S. has now got the right man at its head. He is not likely to be turned from his course by any cold douche of implied criticism of policy. It is all very well to keep the screw on when slackness or inefficiency is apparent, but to apply it when people are doing their obvious best under all the circumstances of the moment is, we think, to be deprecated. Nothing is more calculated to take the heart out of men who have already a sufficiently difficult task to carry out.

♦ ♦ ♦

**The  
Abolition of  
War.**

This is the age of leagues. It does not seem to matter what the idea or how far-fetched the theory evolved by the individual, there appears to be only one obvious thing to be done as soon as the idea or the theory has been born alive—to form a league for its exploitation. One of the latest of these bodies is known as the League to Abolish War. It held a meeting the other day, at which the "star turn" was Mr. G. N. Barnes, the Pensions Minister. The idea as set forth by the league is that, after the present war—if there is any "after"—there should be a Hague Conference, at which the Powers should bind themselves to submit all disputes to the arbitration of the Tribunal, affixing the penalty of an economic boycott to any refractory Power, with coercion by armed force as a last resource.

"Coercion by armed force" may sound better than crude "war," but it somehow seems to us to have very nearly, if not quite, the same meaning. As a matter of fact, it does not appear possible to differentiate between them. That is just where the shoe pinches, and will continue to pinch as long as men are human. What the abolitionists appear to lose sight of is that all law and order rests ultimately upon a basis of physical force, and can rest upon nothing else. That is as true of nations as it is of individuals and communities. You may try to rule the world by "scraps of paper," but those same scraps will carry weight just so long as all the parties thereto feel that they are not strong enough to tear them up without serious consequences to themselves. We know the view that Germany takes of these matters. So long as she felt like respecting treaties, because alone of her relative weakness, she respected her solemn obligations. The moment she felt that she was strong enough to tear them up with safety to herself, what happened? We know too well to require a categorical answer.

The economic boycott of the refractory party to a "scrap of paper" sounds very well in theory, but

there are difficulties of practice which make it a far less potent weapon than it appears on the surface. It is not necessary to go into the detail of the argument why this should be so, because it is perfectly obvious that, as we have seen all through this war, where you have a purchaser prepared to pay he can always buy. Moreover, to enforce the economic boycott would mean a blockade if the boycott was to be effective and a blockade is an act of war. It may not actually be accompanied by bloodshed, but it is a hostile act all the same, and by putting it in operation we have not got away from war in a technical aspect at least. Again, and this is perhaps the weightiest argument of all, no agreement by individual States will prevent the *rapprochement* of Powers whose interests are identical and in opposition to those of another group. The moment this grouping of States comes into operation you have all the potentialities of hostile action, and there is nothing in the world to prevent the group that feels itself strong enough to tear up the arbitration treaty and go for the neighbouring State or coalition from doing so. There is always the possibility, even the probability, that the nations will split into two main groups of nearly equal strength, composed of those who mean to respect their undertakings from a sense of honour and those who keep their engagements because they are compelled by the pressure of *force majeure*. Then, sooner or later, there will be war with the initial chances of success on the side of the treaty-breakers, who will have laid their plans and made their preparations. We surely need no better object-lesson in that than that the Central Powers have already given us. For our own part, we are as ardently in favour of the abolition of war as the best of the leaguers, but we are not given to chasing chimera. So long as human nature remains what it is the world will have to reckon with the *ultima ratio regum*. That is one of the few certainties upon which we can count, and the nation that adopts a policy of disarmament on the faith of solemn contracts to which the Powers of the earth have set their hands will be inviting disaster. Leagues and treaties are all very well in their way and may accomplish much, but it will remain as true after the war as it was before that the best guarantee against external attack is internal preparedness. And in this supremacy in the air looms exceedingly large.

♦ ♦ ♦

**Hall Caine  
on  
Reprisals.**

In the issue of the *Daily Chronicle* of the 14th inst. Mr. Hall Caine answers the Archbishop of Canterbury and his fellow opponents of reprisals in the course of a long and convincing article, to which it seems to us that those to whom it is addressed will find it hard to make an effective reply. So sound are the views and so well and logically are they expressed, that we think the Government might do a great deal worse than reprint and circulate it broadcast at home and in the Allied and neutral countries—wherever, in fact, there is any volume of opinion which holds that reprisals for outrages on the laws of humanity are not justifiable. After pointing the analogy between the act of the civil law which takes the life of the murderer in order to deter individuals from becoming murderers, and the nation which find itself compelled to take reprisals to deter its enemies from outrage, Mr. Hall Caine goes on:—

"But, it will be asked, because the enemy sinks a ship full of helpless wounded men, are we justified in bombing





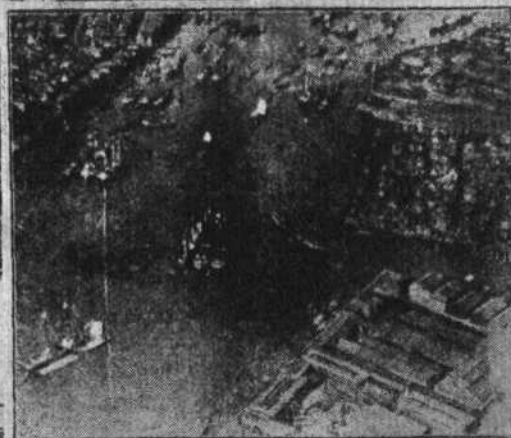
機の前より見た河川と市街



遠くを流れる河川と市街



市街と河川を隔てる堤防



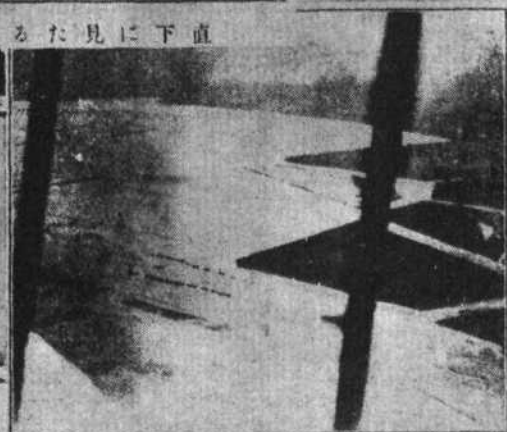
直下に見た河川と市街



機右側より見た市街と河川



空中より見た市街と河川



河川と市街を隔てる堤防



空中より見た市街と河川

FROM ABOVE.—Views of Tokyo city taken from the Japanese military aeroplane No. 3 Tsurugi. (From the "Japanese Aeronautical World.")



an unfortified town, and thereby killing his innocent women and children? The answer is a hard and bitter one, in view of the unmerited suffering which it seems to excuse—everything depends upon necessity. If there is no law to punish the inhumanities of the enemy when he sinks hospital ships; if every human impulse in the enemy is suspended; if he is a base and crafty coward, always struggling to be beforehand with acts of cruelty and barbarity, it may be necessary, and if necessary it must be right, to restrain him and make him repent, by whatsoever means of punishment lie within our power to inflict. That such means may involve the suffering of the innocent is indeed a tragic sequel. But the suffering of the innocent is inevitable in any case, and the only open question is whether it is to be that of our own innocent or of the enemy. . . . The Archbishop of Canterbury and his fellow-Churchmen are very properly anxious that we of the Allied nations should emerge from the war untarnished by the foul crimes that will stain the name of our enemy. But I think he does not see that the whole principle of defensive warfare is founded on reprisal. War is a system of reprisal, but not necessarily of revenge. To restrain and deter the enemy and to make him repent is the first and last law of self-defence. The enemy attacks us with bows and arrows; we repel him with stronger bows and arrows; he attacks us with rifles; we repel him with better rifles; he attacks us with guns and shells; we repel him with bigger guns and shells; he attacks us with deadly gases; we repel him with yet deadlier gases. If defensive warfare is right, this is right. The moral wrong lies with those who begin an unjust war, and with them alone. . . . To condemn warfare altogether, even when it is defensive warfare, on grounds of religion and humanity, may be to take up a logical and even an exalted position; but to justify war and to condemn its natural if tragical developments, is to strain at the gnat and swallow the camel.

"It is no reply to say that in reprisals we may be fighting those who are not fighting us. Since the day when David went out to meet the Philistine the fate of the non-combatant has been in the hands of the combatant. It is no answer to say reprisals are barbaric. All warfare is barbaric. Aggressive warfare is barbaric insanity; therefore defensive warfare becomes barbaric necessity. In the absence of law to punish wrong, what is necessary is right. Reprisal is of the essence of warfare, and must stand or fall with it."

There is really nothing to be added to this able justification of the policy which German violations of the laws of war and of humanity have compelled this country, much against its will, to adopt. We will, therefore, leave it at that, with a simple expression of our satisfaction that so able a writer has so fully and logically set forth the point of view from which we ourselves have approached this distasteful subject since we were reluctantly converted to advocacy of the policy of deterrent reprisal.



## The Civil Aerial Transport Committee.

MAJOR BAIRD, M.P., informed Mr. Butcher in the House of Commons on May 22nd that the composition of the Civil Aerial Transport Committee to enquire into aerial civil communications after the war will be as follows:—

Lord Northcliffe, Chairman; Major Baird, M.P., Deputy-Chairman; the Duke of Atholl (Chairman of the Royal Aero Club), Col. Lord Montagu (who will also represent the India Office), Lord Sydenham, Mr. Balfour Browne, K.C., Mr. A. E. Berriman, Mr. G. B. Cockburn, Mr. G. Holt-Thomas, Mr. Claude Johnson, Mr. Joynson-Hicks, M.P., Mr. F. W. Lancaster, Lieut.-Col. M. O'Gorman, Major-Gen. Ruck, Mr. J. D. Siddeley, Mr. T. Sopwith, Mr. H. G. Wells, Mr. H. White-Smith, Mr. W. Tyson Wilson, M.P.; Sir Laurence Guillemard, representing the Treasury and Board of Customs; Col. J. W. Pringle, R.E., representing the Board of Trade; the Earl of Drogheda, representing the Foreign Office; Mr. G. E. A. Grindle, representing the Colonial Office; Mr. G. E. P. Murray, Secretary of the Post Office, representing the Postmaster-General; Sir Thomas Mackenzie, High Commissioner for New Zealand; and Mr. W. P. Schreiner, High Commissioner for the Union of South Africa. It is hoped that Canada and Australia will also nominate representatives. Capt. Vyvyan has been nominated by the Fifth Sea Lord of

## The Civil Aerial Transport Committee.

At the moment of going to press the composition of the newly-formed Civil Aerial Transport Committee, which is to enquire into the possibilities of commercial aeronautics after the war, is to hand. Its composition must be said to be eminently satisfactory from every point of view. Not only is its personnel unexceptionable, but its scope is practically unlimited within its generous terms of reference. When we regard its composition, we are assured that every possibility will be weighed; more than that, new possibilities will be created. The men of imagination, the men of affairs, and the men of influence who are on the committee will see to that. At the same time the theoretical side of aeronautics, the constructional, design, and manufacturing interests, and those representative of the aero engine are all there to give effect to that close co-operation which is so necessary to sound progress.

Of no less importance is the fact that the Flying Services are represented. We cannot again allow ourselves to fall into the grave error in which we began this war, and we must see to it that both the civil and military sides of aviation develop and progress hand in hand. Only by the closest association of the two interests can this be achieved, and we do not think that any better scheme of co-operation between the two branches could be devised than will come into operation as a result of their association through the committee.

That the scope of commercial aeronautics is fully realised is evidenced by the fact that various departments of State, such as the Foreign Office, the Colonial Office, and the Post Office, are represented, which again augurs well for the future of aviation, since a great proportion of aerial intercommunication after the war will be between the Motherland and the Colonies. At the time of writing Canada and Australia have not yet nominated their representatives, but it is expected that they will do so immediately, thus completing the number of colonies represented on the committee.

Altogether it would be difficult to criticise the composition of the new committee even were one inclined to be critical, the work of which, under the chairmanship of Lord Northcliffe, who has done so much in the past for the cause of aviation, may be looked forward to with every confidence.

the Admiralty to represent the R.N.A.S., and Brig.-Gen. Brancker will represent the R.F.C. The Meteorological Office have also been asked to name a representative, and one or two additional names will be subsequently announced. Mr. D. O. Malcolm will be the Secretary of the Committee, whose offices will be at Winchester House, St. James's Square.

## The Naval Fight in the Adriatic.

IN the Admiralty account of the naval fight in the Adriatic on May 15 it was stated that Italian airmen, after a battle in the air, attacked the Austrian warships outside Cattaro, and they confidently assert that one of the enemy cruisers was heavily on fire, and was being taken in tow off Cattaro in a sinking condition; one other enemy cruiser is reported by the British Admiral as being "badly damaged."

A semi-official statement issued in Rome said our daring seaplanes, after repulsing the hostile machines in an aerial combat, attacked the enemy ships with bombs, and were subsequently able to confirm the serious damage suffered by them as the result of the fire to which they had been subjected. Two different aeroplanes reported that one of the enemy cruisers, which was completely shrouded in smoke, with its afterpart destroyed, was on the point of sinking close to Cattaro. All the units engaged in the actions returned to our bases, as also did all our aviators.



## THE ROLL OF HONOUR.

## Reported by the Admiralty:—

**Killed.**

M 13049 1st Air-Mech. J. L. Coghlan, R.N.A.S.  
F 7129 1st Air-Mech. A. G. Lockyer, R.N.A.S.  
J 11292 Ch. 1st Air-Mech. G. V. Turner, R.N.A.S.

**Died of Injuries.**

F 5426 1st Actg. Mech. P. Dear, R.N.A.S.  
F 21095 2nd Air-Craftsman G. R. Woodnough, R.N.A.S.

**Previously reported Missing, now reported Killed.**

Flight Sub-Lieut. J. J. Malone, R.N.  
Flight Sub-Lieut. L. M. B. Weil, R.N.

**Wounded.**

Flight Sub-Lieut. G. A. Magor, R.N.

**Missing.**

Flight Sub-Lieut. G. G. Avery, R.N.  
Flight Sub-Lieut. M. W. W. Eppstein, R.N.  
Flight Sub-Lieut. W. R. Walker, R.N.

**Previously reported Missing, believed Killed, now unofficially reported a Prisoner of War.**

Flight Sub-Lieut. R. K. Slater, R.N.

## Reported by the War Office:—

**Killed.**

2nd Lieut. N. Butterworth, Manchester and R.F.C.  
Lieut. H. C. Cutler, Yeo. and R.F.C.  
Lieut. W. E. Davies, Alberta, attd. R.F.C.  
2nd Lieut. J. C. Day, R. Sussex, attd. R.F.C.  
2nd Lieut. A. W. Mason, R.F.C.  
2nd Lieut. I. ap R. Owen, R.F.C.  
2nd Lieut. R. P. O. Weeks, R.F.C.  
65310 Pte. A. Fyffe, R.F.C.

**Previously reported Missing, now reported Killed.**

Lieut. W. A. Campbell, Brit. Columbia, attd. R.F.C.  
2260 Sergt. A. Walker, R.F.C.

**Previously reported Missing, believed Killed, now reported Killed.**

2nd Lieut. D. H. Glasson, R.F.C.

**Previously reported Wounded, now reported****Died of Wounds.**

2nd Lieut. J. H. Westlake, R.F.C.

**Accidentally Killed.**

2nd Lieut. F. W. Ham, R.F.C.  
2nd Lieut. R. Robertson, Hampshire and R.F.C.

**Previously reported Missing, now reported Died of Wounds as a Prisoner of War in German hands.**

Capt. G. S. Thorne, R.F.C.

**Previously reported Missing, now reported****Died as Prisoners in Turkish hands.**

4477 Sergt. A. Webb, R.F.C.  
7870 2nd Air-Mech. S. J. Wells, R.F.C.

**Wounded.**

Lieut. E. Alder, Manitoba, attd. R.F.C.  
Capt. H. H. Balfour, King's R.R.C., attd. R.F.C.  
Lieut. C. G. Clay, Sher. For. and R.F.C.  
2nd Lieut. E. A. W. Cruickshank, R.F.C.  
Capt. E. W. Deane, N. Staffs., attd. R.F.C.  
Lieut. J. L. Dickson, Cen. Ontario, attd. R.F.C.  
Major W. S. Douglas, M.C., R.F.A. and R.F.C.  
2nd Lieut. H. E. K. Eccles, R.F.C.  
Lieut. H. E. O. Ellis, M.C., R.E., attd. R.F.C.

2nd Lieut. H. R. Eycott-Martin, R.E., attd. R.F.C.  
2nd Lieut. G. E. Hawksley, R.F.A., attd. R.F.C.  
Lieut. J. O. Leach, M.C., Mddlx., attd. R.F.C.  
Major L. W. Learmount, M.C., R.F.C.  
Capt. W. W. Leete, Cheshire and R.F.C.  
2nd Lieut. D. Leishman, R.F.C.  
2nd Lieut. F. M. Magenais, R.F.C.  
Lieut. T. W. McConkey, Manitoba, attd. R.F.C.  
2nd Lieut. F. McQuiston, R.F.A. and R.F.C.  
Capt. H. Meintjes, R.F.C.  
2nd Lieut. W. K. Mercer, Gordon Hrs. and R.F.C.  
Capt. F. D. Pemberton, R.F.A., attd. R.F.C.  
2nd Lieut. W. T. Price, R. Warwicks, attd. R.F.C.  
Lieut. W. C. Rowe, Ox. and Bucks L.I., attd. R.F.C.  
Lieut. A. R. Sortwell, A.S.C., attd. R.F.C.  
2nd Lieut. J. S. Stubbs, S. Lincs., attd. R.F.C.  
2nd Lieut. H. R. Wilkinson, R.F.C.  
Lieut. B. A. Wilson, Manitoba, attd. R.F.C.

**Missing.**

2nd Lieut. F. Adams, R.F.C.  
Capt. A. Ball, D.S.O., M.C., Sher. For. and R.F.C.  
Capt. A. T. Cull, Seaforth Hrs., attd. R.F.C.  
2nd Lieut. H. C. Duxbury, R.F.C.  
2nd Lieut. C. A. M. Furlonger, R.F.C.  
2nd Lieut. C. S. Gaskian, R.F.A. and R.F.C.  
Lieut. C. V. Gaultier, K.O. (R. Lincs.), attd. R.F.C.  
2nd Lieut. G. C. T. Hadrill, A.S.C., attd. R.F.C.  
Lieut. J. B. Harvey, Cen. Ontario, attd. R.F.C.  
Lieut. T. G. Holmes, R.F.C.  
2nd Lieut. J. S. Holroyde, E. Yorks., attd. R.F.C.  
2nd Lieut. G. W. Jackson, N'land. Fus. and R.F.C.  
Lieut. A. J. Jessopp, R.F.C.  
2nd Lieut. M. M. Kaizer, R.F.C.  
2nd Lieut. O. R. Kelly, N'land. Fus., attd. R.F.C.  
2nd Lieut. H. Kirby, R.F.C.  
2nd Lieut. C. W. Lane, King's R.R.C., attd. R.F.C.  
Lieut. A. W. Martin, Yorks. and R.F.C.  
2nd Lieut. C. W. McKissock, R.F.C.  
Lieut. W. L. Mills, R.F.A., attd. R.F.C.  
2nd Lieut. E. S. Moore, R.F.C.  
2nd Lieut. R. M. Chaworth Musters, Leicester, attd. R.F.C.  
Capt. W. E. Nixon, K.O. Scot. Bord., attd. R.F.C.  
2nd Lieut. B. W. Pitt, R.F.C.  
2nd Lieut. D. J. Sheehan, R.F.C.  
2nd Lieut. C. R. Sloan, R.F.C.  
2nd Lieut. N. L. Steele, Australian Flying Corps.  
2nd Lieut. T. Webb, R.F.C.  
Lieut. T. H. Wickett, W. Ontario, attd. R.F.C.  
Capt. W. G. B. Williams, M.C., R.F.C.  
2nd Lieut. G. Wood, R.F.C.  
2nd Lieut. F. H. Woolliams, R.F.C.

**Previously reported Missing, now reported Prisoners of War in German hands.**

Lieut. W. Anderson, M.C., R.F.C.  
2nd Lieut. C. D. Bennett, R.F.C.  
2nd Lieut. D. C. Birch, Northampton., attd. R.F.C.  
Lieut. J. K. Bousfield, M.C., R.E., attd. R.F.C.  
Lieut. L. Dodson, M.C., S. Staffs. and R.F.C.  
2nd Lieut. K. R. Furniss, Yeo. and R.F.C.  
Lieut. C. G. Gilbert, R.F.C.  
Lieut. M. Lewis, R.F.C.  
Capt. R. A. Logan, R.F.C.  
2nd Lieut. S. A. Sharpe, R.F.A., attd. R.F.C.  
Lieut. A. P. Warren, R.F.C.  
Lieut. A. D. Whitehead, R. Warwick., attd. R.F.C.

**Aerial Photography and Artillery Work.**

THE *Morning Post* correspondent on the British Front, writing on May 21st, said:—"You cannot realise the terrible effect of modern artillery fire concentrated on a narrow front unless you have seen photographs of this bit of the Hindenburg line, showing it as it existed before our bombardment and as it is to-day. As pictured from an aeroplane it looked like a beautifully neat and immaculate model worked in wet clay, with every traverse mathematically exact, and every elaborate detail shown in bold relief. Then the guns were turned on it. A few days later the outline showed blurred and broken—you could still follow the angle of the front line on the ground, but that was all. The last photograph shows nothing but a patch of mottled ground without the faintest trace of trench or traverse, or any mark that might have been made by the hand of man. There is a faint smudge

in one corner that experts could identify as the support line, but of the Hindenburg front barrier there is nothing, absolutely nothing.

**An Aerial "Barrage."**

RATHER a pretty aerial spectacle was to be witnessed near Gavrelle yesterday, wrote Reuter's correspondent on Monday. One of our aeroplanes had been swooped upon by nine German planes. The British machine got ahead of its pursuers, but this advantage could be maintained only for a short time. A couple of our anti-aircraft batteries thereupon put up a barrage as close as was safe in the wake of the chased plane and followed it along. The effect was very striking, and when one of the enemy machines was seen to nosedive and then spiral rapidly towards the ground a confused, far-flung cheer was borne upon the breeze. After this the Huns abandoned the pursuit and our machine landed safely.



# **"THE NAVY-THAT-FLIES."**

## II.

THE Navy-that-Flies had been in France some time before the Army heard very much about its doings. This was not so much the fault of the Army as the outcome of the taciturn silence in which the Navy-that-Flies set to work. It had been bidden to observe the traditions of the silent Navy, and it observed them, forbearing even to publish the number of Boche machines it accounted for day by day. But there came a time when its light could no longer be hid under a bushel. "Hullo!" said the generals and others concerned with the affairs of the entrenched Army, speaking among themselves, "What about it?" They consulted the Army-that-Flies.

Now the Army-that-Flies had been confronted in the early days of the war with, perhaps, the toughest proposition that was ever faced by mortals of even their imperturbable courage. In numerical inferiority to the enemy, it had been called upon to maintain a ceaseless photographic reconnaissance far behind the enemy's trenches; to spot for the guns of the Army along a suddenly extended front; to "keep the wind up" the Boche so that for every 10 of our machines that crossed the German lines barely one of his would dare to cross ours. This is called aerial supremacy, and they established and maintained it with fewer and worse machines than they care to talk about to-day.

"Of course, we know all about these naval johnnies," said the Army-that-Flies; "they'd steal grey paint from their dying grandmothers, and they fear nothing in the heavens above nor the earth beneath nor the waters under the earth. They are complaining that things are getting a bit dull along the coast. . . . We might show them a thing or two if they cared to join up with us for a while." "Let's ask them," said the Army. So the Navy-that-Flies was invited to "co-operate with the Royal Flying Corps on such portions of the line where its experience of escort work and offensive patrols would prove of the greatest value." Or words to that effect.

The Navy-that-Flies accepted the invitation with suppressed exultation, and detailed certain squadrons of fighters. It admits having selected picked pilots, because there was the credit of the old Navy to consider. Each squadron was entrusted to the care of a seasoned veteran of fully 25 summers, and of the Flight Leaders there was one that had even turned 21. In short, the Navy-that-Flies was sending of its best; and its worst was very good indeed. They flew away from the coast and the sea, and their motor transport rumbled through the empty plains of France, till they closed upon the fringe of the entrenched Army. Here, perched above the surrounding country on some plateau or hillside, with the ceaseless murmur of the guns in their ears, each of the squadrons rigged its flagstaff, and hoisted the White Ensign, set up the grey-painted huts, and the ship's bell that divided the day into ship-watches, slung their hammocks, and announced they they were ready to "co-operate" with anybody or anything. The Army-that-Flies laughed at the ship's bell, and the rest of the naval shibboleth, but it took the visitors to its heart. With hands deep in the pockets of its "slacks" and pipe in mouth, it came over and examined the fighting machines of the Navy-that-Flies and the "doo-hickies" thereof, and it said things under its breath.

The Navy-that-Flies did not waste much time looking about it. One fire-eater, setting off to explore the country some 30 miles behind the German lines, came upon a school of "Quirks." Quirks, it may be explained for the benefit of bipeds, are young Boche aviators in an embryonic stage. From the convenient ambush of a cloud he watched their antics for a while as they flopped about above their aerodrome; and then, descending like a thunderbolt, he tumbled three over, scattering the remainder, and returned to make his report. The squadron listened gravely to the story, and concluded that the Golden Age had dawned. But sterner work lay ahead, and a fair sample of it is contained in a report of another young gentleman who went scouting single-handed over the German lines what time the "Gentlemen of England" were, if not abed, cracking the first of their breakfast eggs.

He was attacked by two single-handed "Albatros" machines and a Halberstadt fighter. Into the engine of the latter he emptied a tray of cartridges, with the result that it immediately went spinning down; to make assurance doubly sure he fired another 50 rounds into the whirling wreck as it fell. By this time a veritable hornets' nest appears to have risen about his ears. Three more "Albatros" machines whirled to the attack, and in his subsequent report he noted with artistic enjoyment that the head of one pilot precisely filled the ring of his sight. This eye for detail enabled him to recall the fact that he saw three bullets actually strike the

pilot's head, with the not surprising result that the would-be-avenger heeled over and spun to the ground. By this time he had been driven down to a height of 200 ft. above German-occupied territory, and having lost sight of the remainder of his aggressors, he decided to return home at that height. As was to be expected his adventures were by no means terminated by this decision. An astonished company of German cavalry drew rein and peppered him with rifle shots as he whisked over the top of their lances. Five minutes later another "Albatros" attacked him.

He rocked the machine in giddy sweeps until within 50 yards of his opponent, and side-looped over him (this, remember, at 200 ft. from the ground), fired a short burst, and drove the Hun off for a moment while he regained equilibrium. Then once more the enemy swooped upon him. From this point onwards the reader may be warned against vertigo. The pilot's own version, the bald official report of the affair requires no embellishment or comment, though the latter is not easy to suppress. "These operations," he states, "were repeated several times with a slight variation in the way I looped over him (flying against a head wind). When he was about 150 yards behind me, I looped straight over him, and coming out of the loop dived at him, and fired a good long burst. I saw nearly all the bullets go into the pilot's back, just on the edge of the cockpit. He immediately dived straight into the ground. I then went over the German trenches filled with soldiers, and was fired on by machine-guns, rifles, and small field guns, in or out (ye gods and little fishes!) of range. There were many shells bursting in and about the German trenches."

The report concluded with estimates of the strength of various bodies of infantry and cavalry, movements of convoys and artillery, noticed during the intervals between aerial somersaults. The pilot landed at the first aerodrome he saw, adding in explanation of such an irregular proceeding, that his machine was badly shot about.

The squadrons co-operating with the R.F.C. commenced by faithfully recording all aerial combats in which their machines were engaged. But after a while such events became too commonplace to chronicle. They fought from dawn to dusk, generally a day's journey for a horse behind the German lines. They fought at altitudes at which in spring a thermometer registered 50 degrees of frost, returning with petrol tanks frozen, and hands and feet and ears swollen by frost-nip. One squadron had 100 decisive fights in a month (omitting skirmishes), and accounted for 25 Boche machines. Its log (unofficially termed "Game-book") contained such entries as the following: "Four machines sent up; managed to bag five Huns before breakfast." For the first time in their lives the pilots got all the fighting they wanted, and revelled in it gluttonously. They grew fine-drawn, with the accentuated brilliancy of eye common to men in perfect condition, living at the highest tension. They met winged Death hourly in the blue loneliness above the clouds; the rustle of his sable wings became a sound familiar as the drone of their own engines, so that all terror of the destroyer passed out of their souls, if indeed it had ever entered there. And Death in his turn grew merciful, amazed. At least, this is the only explanation to offer for certain tales that are told along the front where the White Ensign flies. But hear for yourselves and judge.

A naval pilot—a Canadian, by the way—attacked a single-seater Albatros scout at 8,000 ft. above the German lines. He disposed of him after a short engagement, and was then attacked by seven others, who drove him down to 3,000 ft., and shot his machine to pieces. He plunged to the ground, and crashed amid the wreck of his machine a couple of hundred yards behind the Canadian lines, breaking a leg and dislocating a shoulder. A furious bombardment from German heavy artillery was in progress at the time, and he crawled for shelter into a shell hole, where he remained from nine a.m. until four p.m. Fire then having slackened, a party from the trenches who had witnessed him fall from a height of 3,000 ft. went in search of his body with a view to burying it, and found him conscious and cheerful, though very thirsty.

■ ■ ■ ■ ■

## **Allied Raid on Bruges.**

DURING the Allied air raid on May 12th, reports the *Telegraaf's* frontier correspondent, a large number of soldiers were killed at Bruges. Marshal von Mackensen was in the town during the bombardment.

## **Baron von Richthofen Wounded**

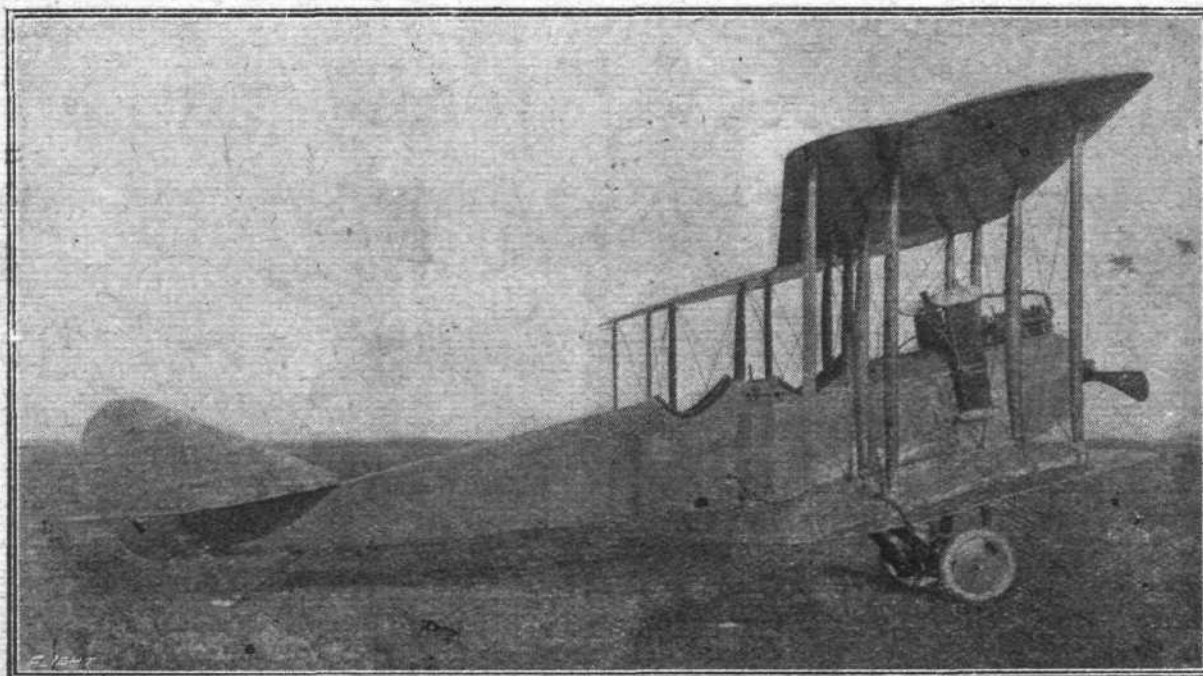
ACCORDING to the *Berliner Zeitung*, Lieut. Baron von Richthofen, who it is claimed has brought down 52 Allied machines, has been wounded.



# THE STANDARD H-3 TRACTOR BIPLANE.

ONE of the recent successful military machines of our new ally, America, is the Standard model H-3 tractor biplane, a number of which are in use with the U.S. Army and Navy. From the accompanying scale drawings and illustrations it will be seen that the main characteristic of this machine lies in the swept-back planes. These, which have a span of 40 ft. 1 in. top and bottom, have a sweep back of  $10^{\circ}$ , as well

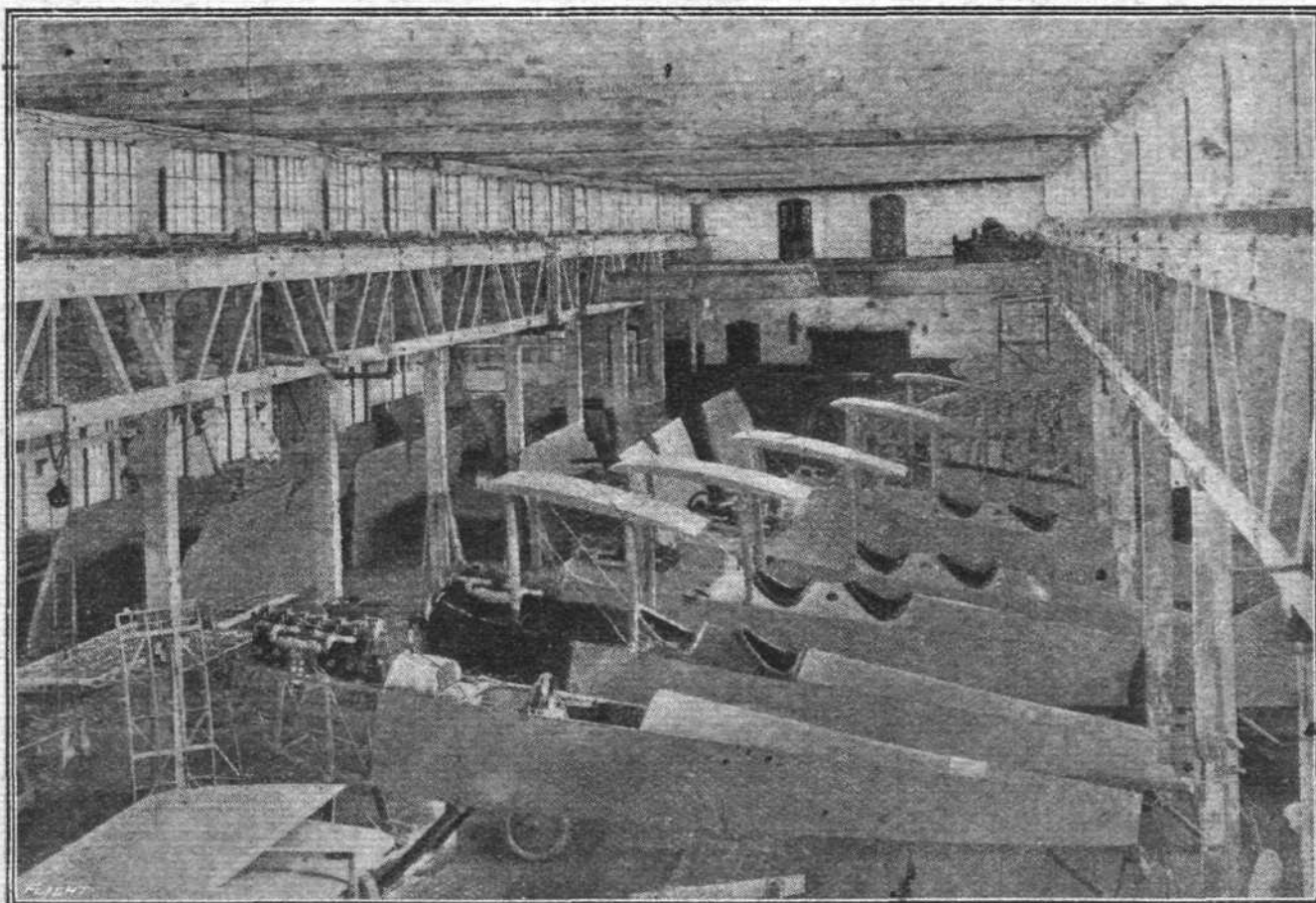
11 in. apart. Solid spruce compression ribs are located at the inter-plane strut attachments, as well as one between each of the inner and outer pair of struts. The wing frame is braced with steel piano wire, and the woodwork is shellaced and varnished before covering in order to prevent the absorption of moisture and consequent distortion. The covering is of unbleached Irish linen treated with four coats of dope and



Side view of the Standard H-3 tractor biplane.

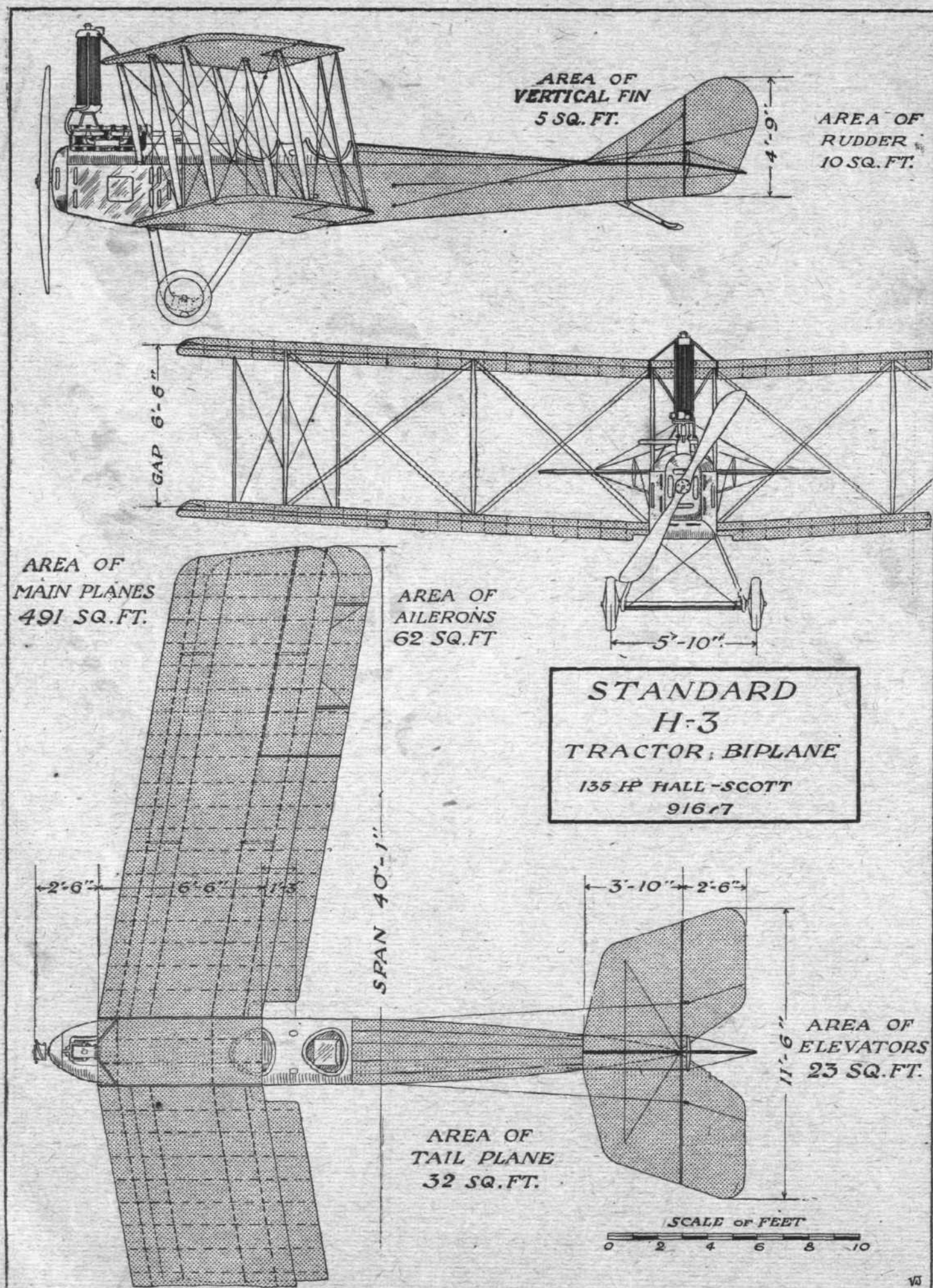
as a forward stagger of  $10^{\circ}$ , or 1 ft. 3 in., and a dihedral angle of  $3^{\circ}$ . They are in sections, the two lower ones being attached direct to the fuselage, and the two top ones attached to a small central panel 2 ft. 8½ in. wide. The main spars are of channel-section, spaced 3 ft. 9 in. apart, the front spar being 9 in. from the leading edge. The ribs, built up of spruce webs and battens mortised, glued and nailed together, are spaced

a finishing coat of spar varnish. Ailerons are mounted on both top and bottom planes, each having an area of 15½ sq. ft. They are inter-connected as follows: two light spruce struts connect each upper and lower aileron, and cables from the trailing edges of the top ailerons are led to the control via a pulley located at the lower end of the outer rear inter-plane strut fitting. The lower ailerons are connected by cables led



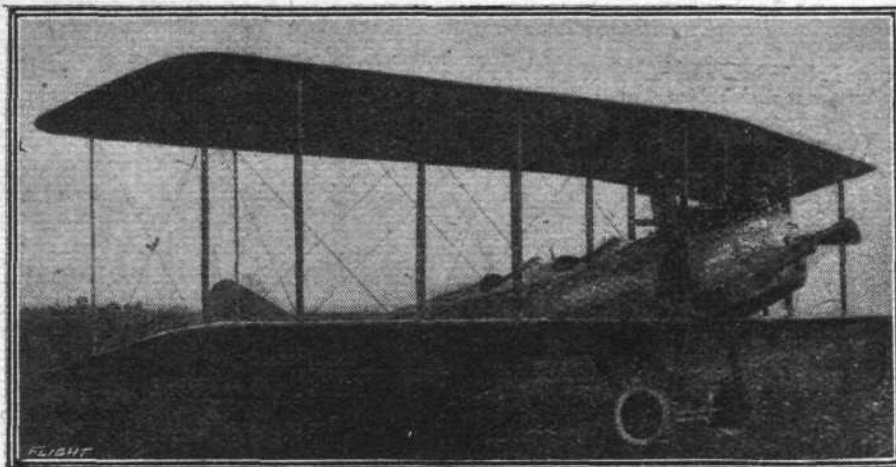
Several Standard H-3 fuselages in course of construction.





THE STANDARD H-3 TRACTOR BIPLANE.—Plan, side and front elevations to scale.



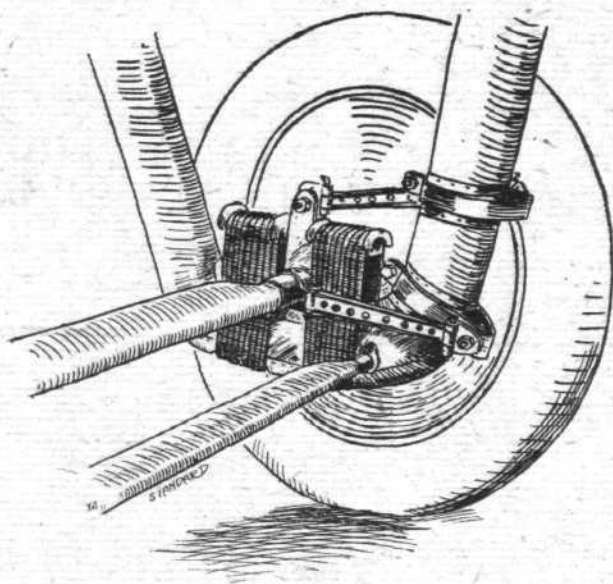


Three-quarter front view of the Standard H-3 tractor biplane.

to similar pulleys on the upper ends of the struts and running beneath the top plane.

Two pairs of struts support the central panel of the top plane above the fuselage, and two pairs on each side of the

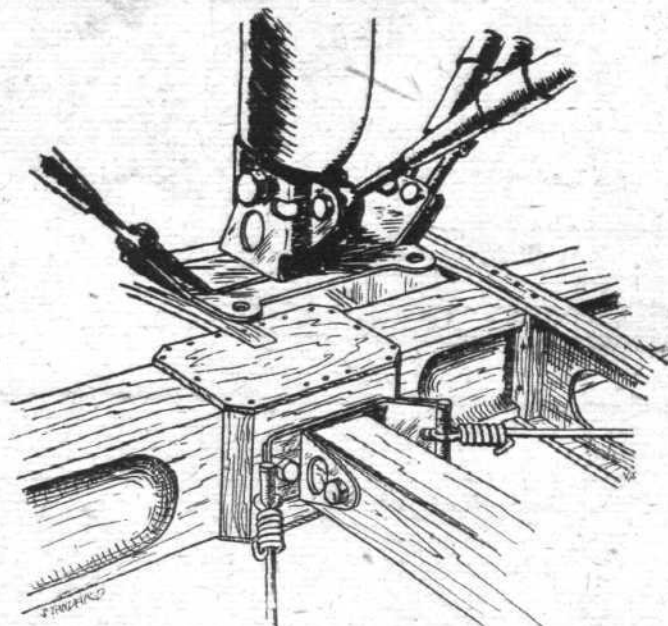
one above the other. The axle is thus forced to move in a vertical path, thereby evenly distributing the strain on the rubber cord. Where the shackles are clamped to the forward part of the U member, the wood is protected by strips of sheet bronze.



The "Pantograph" shock-absorbing device on the Standard H-3 chassis.

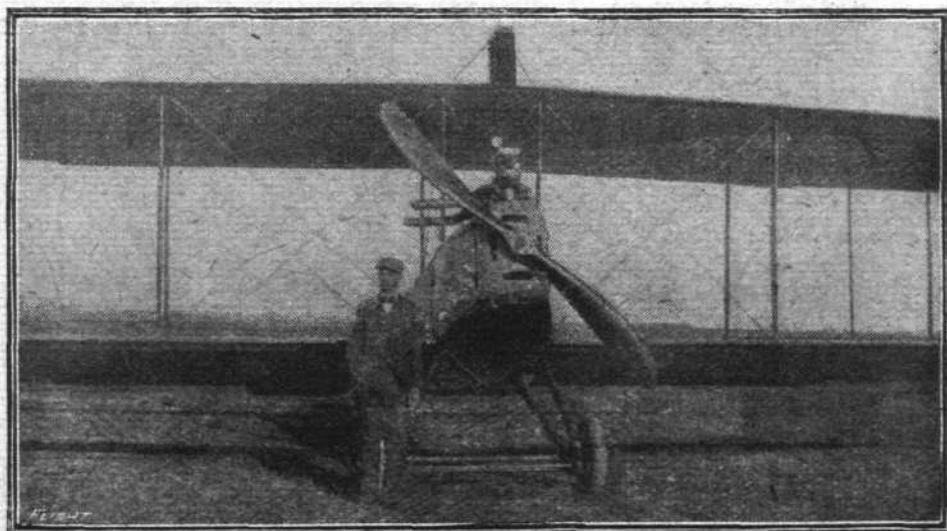
latter separate the top and bottom planes. The ends of the struts are bronze tipped, secured by a single removable pin to the socket. The latter is bent to shape out of sheet steel, and is welded to a plate which is clamped by four bolts on the spar without piercing the latter. Anchorages for the bracing cables are formed on the fitting as shown in the sketch.

The fuselage is rectangular in section, tapering to a vertical knife-edge at the rear. It is 25 ft. long with a maximum width and depth of 2 ft. 9 in. and 3 ft. 6 in. respectively. The longerons are of ash, tapering rearwards from 1 in. square. The uprights are tapered and channeled, and are attached to the longerons by sheet metal clips. The pilot's cockpit is situated well aft of the planes, and the passenger's at the trailing edge. A 135 h.p. 6-cylinder vertical Hall Scott engine is installed in the nose of the fuselage, being supported by stout bearers, the forward ends of which are carried by a heavy-gauge steel plate forming the extremity of the fuselage. The engine portion of the fuselage is covered with sheet aluminium, and a rounded nose of the same material is mounted on the front. The rest of the fuselage is covered with fabric including the turtle deck, which is built up of spruce battens.



Sketch showing the attachment of the interplane strut and compression rib to the main wing spar, with fittings.

The following are the principal dimensions of the Standard H-3 Span, 40 ft.; chord, 6 ft. 6 in.; gap, 6 ft. 6 in.; height, 10 ft. 7 in.; gliding angle, 1 in 8; weight empty, 1,700 lbs.; useful load, 800 lbs.; speed range, 46-84 m.p.h.; climbing speed, 3,500 ft. in 10 minutes.



The Standard H-3 tractor biplane and its designer, Charles H. Day.

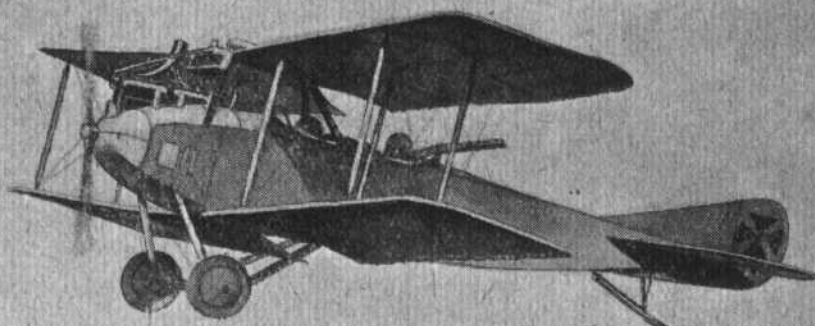




L.V.G.



HALBERSTADT



ALBATROS CIII



AVIATIK



ALBATROS HU



RUMPLER

The Identification of German Aeroplanes. Plate VI.

(See also page 505.)

Strictly Copyright, "FLIGHT."



# IDENTIFICATION OF GERMAN AEROPLANES.

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(Concluded from page 475.)

THE accompanying sketches of six German aeroplanes, which have been plotted by a special method devised by the staff of "FLIGHT," are intended to conclude this series of views, as the machines in question have, we think, been illustrated in a sufficient number of positions to enable anyone to identify the individual machines at a reasonable distance. The respect in which these sketches have been chiefly characteristic and, it is hoped, useful, is that by our method of plotting all the machines are shown in one position, and any difference in shape or peculiarity in any structural member is at once apparent. Secondly, the machines are drawn as near as possible to a uniform scale—in a perspective drawing it is scarcely possible to do so absolutely—so that the relative sizes of the various machines are clearly indicated.

The view published this week has been chosen chiefly to show features which were obscured in previous views. Some of the previous views have shown one, some another of these, but the present view shows most clearly all. We are referring to the general lines of the *fuselages*, the number and position

of guns, and the engines. All these features are visible in this week's view, and will probably be found more useful to pilots who meet them at their own level than to gunners observing the machines from the ground. The sketches are, we think, self-explanatory and do not need any comment. In concluding this series we should like to express the hope that the sketches may have proved of use to gunners as well as pilots at the Front, in which case we shall feel amply repaid for the work involved in producing them.

The following table gives the approximate dimensions of the various machines:—

Name of Machine.	Span.		Length.	
	Top.	Bot.	Gap.	O.A.
	ft. in.	ft. in.	ft. in.	ft. in.
Albatros C. III..	39 2	37 3	5 3	6 1
Albatros Bū. ..	28 4	26 9	5 3	5 9
Aviatik ..	41 0	35 4	6 4	6 1
Halberstadt ..	28 6	26 0	4 6	5 0
L.V.G. ...	42 10	37 10	5 6	5 10
Rumpler ..	40 10	36 10	5 9	5 6

## ROYAL AERO CLUB OF THE U.K.

### OFFICIAL NOTICES TO MEMBERS.

#### Club House.

The following prices have been fixed for the present by the Committee:—

Bedroom (including Bath) ..	..	5s. each per night.
Breakfast ..	..	2s. 6d.
House Luncheon ..	..	2s. 6d.
House Dinner ..	..	3s. 6d.

#### Billiard Room.

The Billiard Room is now open for the use of the Members.

#### Flying Services Fund.

Boxes for collecting subscriptions for the Flying Services Fund are now available, and anyone wishing to have a box can obtain the same on application to the Secretary.

#### THE FLYING SERVICES FUND administered by THE ROYAL AERO CLUB.

THE Flying Services Fund has been instituted by the Royal Aero Club for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are

incapacitated on active service, and for the widows and dependants of those who are killed.

The fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers and men.

Forms of application for assistance can be obtained from the Royal Aero Club, 3, Clifford Street, New Bond Street, London, W. 1.

#### Subscriptions.

	£	s.	d.
Total subscriptions received to May 15th, 1917	11,741	10	0
Staff and Workers of Gwynnes, Ltd. (Thirty-eighth contribution) ..	..	9	9
G. H. Mansfield, Managing Director of the Aircraft Supplies Co., Ltd., 17, John Street, Theobald's Road, W.C.; Proceeds of the sale of copies of "Standard A.G.S. Parts for Aircraft," by Bernard Isaac (First payment on account) ..	..	6	5

Total, May 22nd, 1917 .. .. 11,757 4 11

B. STEVENSON, Assistant Secretary.

3, Clifford Street, New Bond Street, W. 1.

#### Honours for the R.F.C.

THE following decorations and medals have been awarded by the President of the French Republic for distinguished services rendered during the course of the campaign:—

##### Croix de Guerre.

Capt. R. H. FREEMAN, M.C., Worc. Regt., S.R., and R.F.C.  
156 Flight-Sergt. E. A. GIBBS, R.F.C.

##### Medaille Militaire.

1726 Flight-Sergt. D. P. CALDER, R.F.C.

#### Accidents at Flying Schools and Inquests.

AT an inquest on a flying officer who had died from injuries received in an accident the Lincoln coroner said that he felt it would be desirable to ascertain whether it was really necessary for them to be called together for these inquests on flying men. It was obvious that accidents must happen in a flying school, and it was equally obvious that an accident while flying could generally have only one result. That being so, and as he was informed an inquiry was always held into these accidents by the department which was most concerned with the Flying Corps, it seemed to him very questionable whether any real good was served by an inquest being held in these cases. As they knew, when a death occurred in that hospital from wounds received on active service he was able to dispense with an inquest,

and he thought it might be very desirable if a similar regulation could hold good with regard to these flying accidents. He should make a point of writing to the Home Office to ascertain whether they might not be treated in that way.

#### Swelling the Flying Services Fund.

QUITE a nice little start has been made with the contribution—as will be seen in the Royal Aero Club's official notices, a first instalment of £6 5s. is acknowledged per Mr. G. H. Mansfield, Managing Director of A.S.C.—to the above fund from the publication of "Standard A.G.S. Parts for Aircraft." The cost of preparing, printing and publishing "The A.G.S. Book" is borne by the Aircraft Supplies Co., Ltd., and the whole of the proceeds of the sale of this edition is handed to the Royal Aero Club Flying Services Fund without deduction.

One copy is supplied free to principals and heads of departments connected with the aircraft industry, and to Commanding Officers and Chief Stores Officers connected with the Air Services; additional copies may be had on payment of 2s. 6d. each, the whole of which is handed to the Fund.

Its publication was unfortunately temporarily suspended, but permission has now been given for this to be continued, and it is hoped that this will result in a substantial sum being handed over to the Fund.

Applications should be made to the Secretary, The Aircraft Supplies Co., Ltd., 166, Piccadilly, London, W. 1.



# ANSWERS TO CORRESPONDENTS.

[As a number of letters reach us signed with initials only, some of which do not give a complete address, we would point out that such communications cannot be dealt with in our columns. Full name and address, which will not be published, must always be given.—Ed.]

## Notice to Correspondents in General.

Applications for commissions in the Royal Naval Air Service should be addressed to the Director of Air Services, Admiralty, S.W. The necessary form and conditions of entry can be obtained from the Secretary of the Admiralty.

Applications for commissions in the Royal Flying Corps should be sent to the Director-General of Military Aeronautics, Hotel Cecil, Strand, W.C.

Those who wish to enlist in the R.N.A.S. should apply to the nearest naval recruiting station or to the R.N.A.S. Drafting Office, Crystal Palace, S.E. Skilled mechanics are taken whatever their army classification, but unskilled men are only taken if they are classified B1, B2, or C1.

Recruiting for the R.F.C. is closed for the time being, and any enquiries should be made to the Officer Commanding, Royal Flying Corps Depot, Farnborough.

Enquiries with regard to appointments in the A.I.D. should be addressed to the Chief Inspector, Aeronautical Inspection Department, Hotel Cecil, W.C. 2.

**G. J. P.** (Frimley).

Your chest trouble would probably rule you out. You should apply as directed above.

**R. J. T.** (Brentwood).

The fact that you have neither flying nor mechanical experience does not matter. You must obtain permission from your commanding officer to apply for a commission.

**A. C.** (Dundee).

You should apply to A. E. Jones, Ltd., 97, New Oxford Street, W.C., or to T. W. Clarke and Co., Ltd., Hampton Wick, Middlesex.

**W. A. E.** (Horwich).

Scale drawings of the Avro enclosed biplane appeared in "FLIGHT" of August 31st, 1912. Copies can be obtained from "FLIGHT" offices for 1s. 6d. post free.

**J. V. D.** (Woodford Green).

The headquarters of *L'Aerophile* are at 35, Rue François 1<sup>er</sup>, Champs-Élysées, Paris (VIII<sup>e</sup>).

**E. N.** (Birmingham).

In a perfect loop centrifugal force will assist to keep the carburettor working normally. After all, the machine is

only upside down for a moment in an ordinary loop. If the machine were to be flown upside down for any length of time a special arrangement would have to be fitted.

**W. R. H. D.** (N.Z.E. France.)

In the formula  $T = \frac{550 \times \text{HP.} \times \text{Ep}}{V}$ , T = thrust obtain-

able, in lbs., HP = brake horse-power of engine, Ep = efficiency of a propeller, expressed as a decimal, and V = the forward speed of the aeroplane. This only gives approximately correct results, since the efficiency of air screws varies considerably. A good average figure to take for Ep is .75, or 75 per cent. efficiency. A brief consideration will show why T decreases with an increase in V.

One horse-power is equal to 550 foot pounds per second. It will therefore be seen that the product of the thrust of an air screw by the advance of the machine in feet per second cannot exceed 550 foot pounds with 100 per cent. efficiency. Assuming an efficiency of 100 per cent., and a horse-power of one, the formula becomes  $T = \frac{550}{V}$ ; or TV = 550.

In a two-cycle radial engine the method of admitting the charge to the cylinders will vary according to the designer's ideas. One method consists in having external inlet pipes, uncovered by the piston at a predetermined point. If a blower be employed, this might be arranged to compress slightly the explosive charge in a chamber on the end of the crank-case, suitable ports being arranged to uncover the lower end of the inlet pipes at the right moment.

"The Properties of Aerofoils and Aerodynamic Bodies," by A. W. Judge, would furnish you with the information required. It can be obtained from the offices of "FLIGHT," and the price is 15s. 6d., post free.

**E. M.** (Burgess Hill).

The pay of Flight Sub-Lieut. is 10s. per day, plus 8s. a day flying pay. While training a Probationary Flight Officer receives 10s. a day, plus 4s. a day flying pay.

**T. K.** (Wrexham).

There is a chapter on rigging in the "Aeroplane Speaks" by Capt. H. Barber, R.F.C. Copies can be had from "FLIGHT" offices for 7s. post free.

**G. H.** (Lincoln).

For the purpose you mention probably the best book is "Aircraft of To-day," by C. C. Turner, which can be supplied from "FLIGHT" offices for 5s. 6d. post free.

## "AIR NAVIGATION FOR FLIGHT OFFICERS."

UNDER this title Lieut.-Commander A. E. Dixie, R.N., has compiled a book, condensing, as the author points out in his preface, into a small compass all the subjects in navigation that officers in the Royal Naval Air Service are required to know. The utility of the book will not, we think, be confined to the R.N.A.S., but should be found of the greatest value to R.F.C. officers as well, since it deals, in addition to explanations of the use of Admiralty charts, with the employment of Ordnance maps. Furthermore, civilian fliers, who are, of course, comparatively few in number at the present moment, but whose number will increase immensely after the war, will find this book an excellent guide, and so lucid in its explanations and concise in its general text is the book that it cannot fail to prove highly interesting and instructive to those who, although not flyers themselves, are interested in the subject of navigation in a general way.

One excellent feature of the book is that the author does not take anything for granted, but leads the student by easy stages from the simplest to the most complicated problems connected with aerial navigation. In the leading chapters the magnetic phenomena are simply and fully dealt with, the action and peculiarities of the artificial magnet being explained. The next step in the education of the aerial navigator takes

the form of brief references to such magnetic phenomena as magnetic poles, magnetic equator, magnetic meridian, variation and deviation, &c. Then follows a thorough explanation of the fundamental principles of the compass, and the coefficients connected with deviation. The practical correction of a compass is very fully dealt with, as are also methods of "swinging" the compass. This brings the student to a stage where the machine is ready, as far as boxing the compass is concerned, for flying, and the problem of correcting courses is the next to be considered. An excellent chapter on meteorology, followed by a reference to the general weather conditions in the British Isles, will prove both interesting and instructive, as will also the sections dealing with weather rules, astronomy, explanation of nautical tables, &c. The concluding chapters deal with chart and map work, and include, as has already been pointed out, reference to Admiralty charts as well as Ordnance maps. Some very informative subjects are thrown into an appendix, including tables of variation of wind velocity with height. "Air Navigation for Flight Officers," which is published by John Hogg, is a book that can be thoroughly recommended to all interested in this fascinating subject, and can be obtained from the offices of "FLIGHT," the price being 11s., post free.



## AIRISMS FROM THE FOUR WINDS

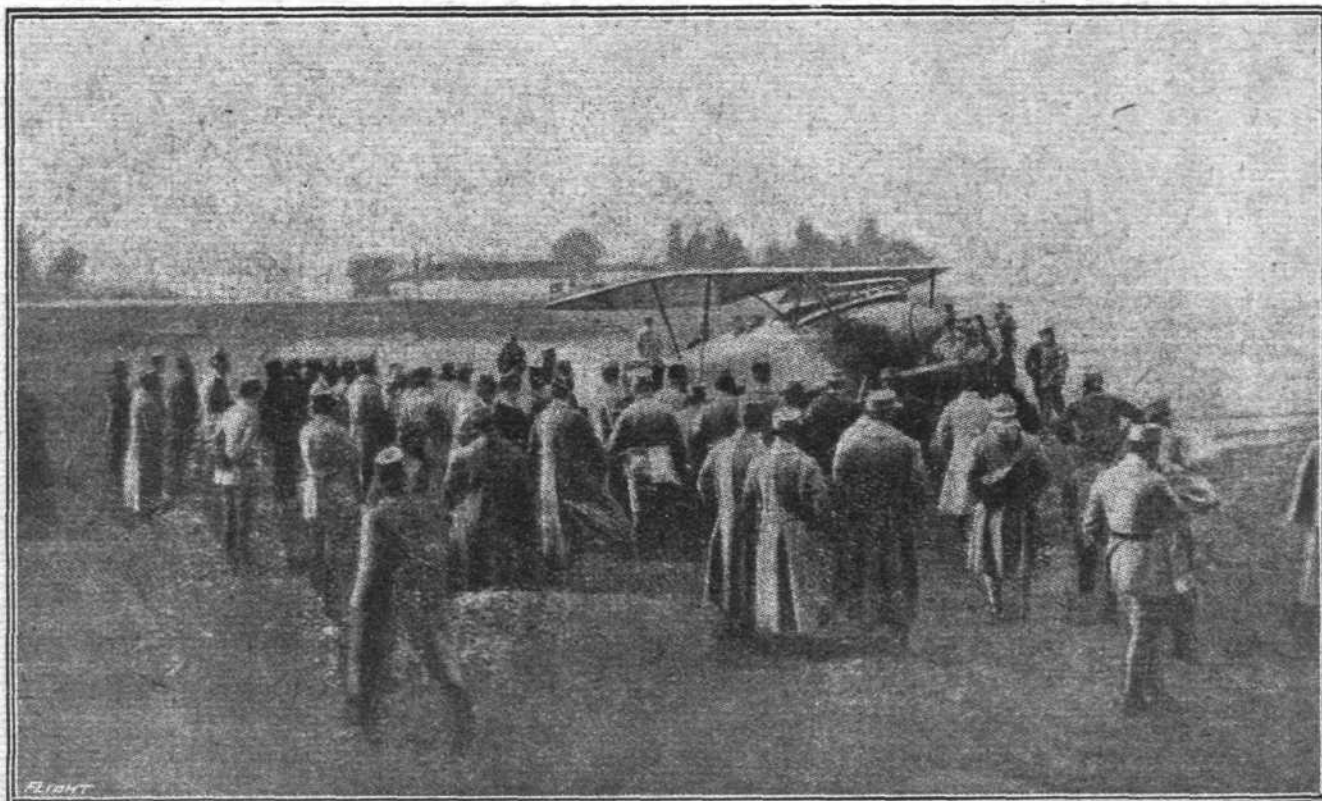
SOME people appear to have quaint ideas of the best way to draw attention to errors of others. Eccentric methods in this direction can, however, at times be a little bit too drastic for most people's liking. The case of the engineer the other day at the London Munitions Tribunal, when a fine of £2 was inflicted upon the culprit for turning out an irregular aeroplane part, emphasises the moral very pointedly. According to the defendant, he claimed that the plans from which he was working were not properly drawn. He thereupon, so he explained, determined upon a little experiment "on his own" to bring it home to the originators of the fault. He made the part a little too short and then welded a small piece on to make it the requisite length, with the result that, had it not been accidentally detected, it must have resulted, the manager declared, in the death of any pilot who took up the aeroplane on which it was fitted. The only excuse in mitigation of his misdeed, besides the apparently illogical claim as to an inaccurate plan, was that, when finished, he had looked around for the foreman to tell him what he had done, but not finding him he just went home and got ill. Seems as if 40s. fine hardly fits the crime, even if the sudden illness arose from realisation of what he had done.

It has taken them a long time to think about it, but better late than never, the L.C.C. Highways Committee has now decided to give compensation to the relatives of three tram-men who were killed by a Zeppelin bomb.

RECENTLY we had to place on record the death of Flight-Lieut. F. N. Clark, who lost his life at Streatham, it will be remembered, as the result of injuries received in a burning aeroplane. To his parents, under the circumstances, any memento of his past honourable career must carry with it something far beyond intrinsic value. Therefore we sympathise with a request which the late pilot's father, writing

from 85, Leigham Court Road, Streatham, has put forward, that a silver cigarette case which his son some little time ago left in a first-class compartment of an early morning train from West Norwood to Victoria, should be returned to him. The sentimental value that attaches to this little item arises from the fact that it was a presentation from the boy's platoon in recognition of his services as their instructor in the Inns of Court O.T.C., and the cigarette case is inscribed accordingly. Mr. Clark writes that: "The article does not appear to have been given up, and doubtless the finder regarded himself as the legitimate owner. Anyhow, we are disposed to view the matter in that light; but I might suggest that, in view of the tragedy of April 29th, we attach great sentimental value to its possession, and if the finder will be good enough to restore it, he or she can keep the £1 Treasury note which was therein; in fact, I should be willing to make a slight recompense for his or her trouble." It is to be hoped, if Mr. Clark's appeal is seen by the finder, that a prompt response will be forthcoming, but, failing that, it would be a graceful act on the part of the platoon, and one which we feel sure they would gladly join in, if they were to duplicate the little gift as a lasting memento.

THE Hun is a wily bird, and when through his military training, is thoroughly imbued with the idea of obeying instructions. But drilling does not necessarily knock initiative and common sense into a wooden-headed subject when actualities are in progress, and that's where the inborn self-reliance of the Briton scores all the time against the passive mind of the average German soldier, who has but one ideal, and that is to be told what to do and when to do it. No doubt the Kaiser now hardly finds his lambs so willing to go to the slaughter as of yore. Hence, probably, the elaborate preparations beforehand of the raw material when any particularly vital job is to be undertaken. The details given by Mr. C. E. W. Bean, Official Press Correspondent with the Australian Force in France, of the S.O.S. method adopted recently by the enemy to knock out the Australians from



By courtesy of "La Guerre Aérienne."

A recent German machine brought down by Capt. Heurtaux, who has now 21 machines to his credit. This is one of the latest types of Albatros.



their hold on the Hindenburg line go to make up a particularly illuminating picture of the strenuous efforts of the present German Staff to keep the Britishers at bay. The Kaiser's favourite Lehr Regiment—nicknamed the "Cock-chafers"—in this instance was the particular unit selected for the honour of being wiped out for the cause of Hohenzollernism, and so thoroughly were they finally sacrificed on the altar of Militarism that mighty few of them ever got the chance of flying back to their jumping-off ground. Getting down to the official account, the story runs as follows.

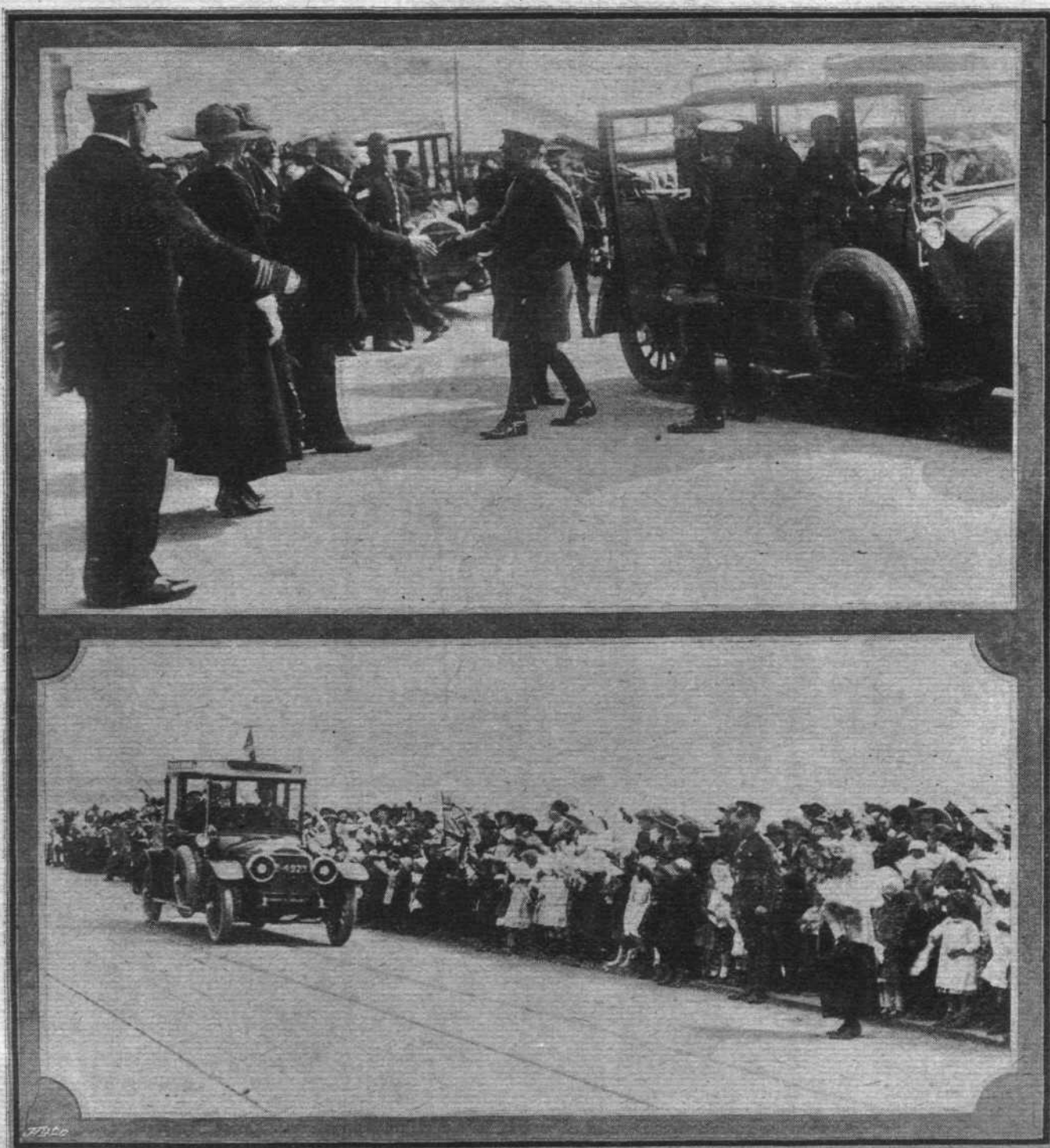
"When the Lehr Regiment got out into rest on May 12th it was informed that, in consideration of its prowess, it was to be given the task of taking back the portion of the Hindenburg line which had been lost by the Germans on May 3rd. The attack was to be very carefully practised, and after it had been carried out the regiment would be definitely taken out of the line for a rest.

"Aeroplane photographs were taken of the part of the line held by the Australians on the right, where they touched the Germans in the Hindenburg line. And from these a set of dummy trenches was dug in the rest area. The regiment set itself to practise against these replica trenches exactly

the attack which it would make against the right of the Australians in the Hindenburg line. It went over the attack first by day, and then afterwards repeated it by night. There were men told off with little white screens which were to be planted to show exactly the position which they had reached. Each man in the attack knew where to go, and what to do, so that even if his company officers and non-commissioned officers were killed the attack would go on unaltered. Three days later the regiment marched back to take up its positions.

"In the actual attack in the early hours of the morning, within two minutes of the assault having begun, the results of all this careful planning and practice had been thrown to the winds. All that remained of it was between 200 and 300 Germans in a section of Australian trench with scarcely any idea of where they were, and what was happening, and machine-gun bullets sweeping above their heads and making any sort of movement highly dangerous."

A British barrage then drew a line just behind the Germans, so they had no alternative but to see the thing through, and Mr. Bean ultimately concludes his recital with the statement, "and I do not think that a single German of those then in the place reached the German lines."



ROYAL VISIT TO MESSRS. VICKERS' WORKS, BARROW.—Top photo.: Mr. Albert Vickers, Chairman of Vickers, Ltd., receiving H.M. the King at the works. Below: Their Majesties crossing Walney Bridge to the Vickers model town.



Who said it was "R R" engines?

WITH the passing of Rowland Ding a personality of much value has gone from the world. In Leeds, where his activities of late were centred, he was very popular and much respected, and his tragic fate has created a big void in the city. Apart from indulging passengers and a few prominent inhabitants in the novelty of a ride over the smoky clouds of the city, the well-known pilot was in the habit of according the privilege whenever he could to the employees at the aeroplane manufacturers' works with which he was associated. The late Mr. Ding had "taken up" at one time or another some 50 of these workers, whose interest in their daily work was quickened by the sensation of enjoying a real flight. In fact, it had become a whispered secret at the works that a worker's name would reach Mr. Ding and be included in his list of passengers if he or she gained the notice of the foreman and the approbation of the manager by increased zeal, and the man at the bench and the girl at the lathe—at least the many of them who craved a flight—strove hard to secure the privilege.

FIRST-CLASS A.M. MARSHALL has broken out into verse over

"REBUILDING M.F.S.H. A. 2523."

This is how he feels about it, and it may raise a sympathetic smile with those who know what "rebuilding" really means:

Old Bus! Phoenix like, from thy old ash reborn,  
To mount again the skies in flights sublime:  
Know'st thou, old friend, that this, thy second youth,  
Is partly ours, and partly thine?

Old Bus! When first we saw thee, wrecked wert thou,  
It seemed, beyond the art of man to mend.  
Long hours we wro't upon thee, and did try,  
Like destiny, to shape thy second end.

Old Bus! From whom at first much was expected,  
Why camest thou down in such a sorry plight?  
They fashioned thee to soar up like the eagle.  
Why didst thou fail in flight?

Old Bus! Now thou again hast started mounting  
O'er Sarum's vast and rolling muddy run;  
We look to thee to teach our trusty pilots  
To go and strafe the Hun.

Old Bus! From out our hands now thou hast passed,  
We speed thee forth in Britain's conquering name.  
May everlasting luck attend thy flyings—  
But don't come back again.

SORRY to see the Chancellor of the Exchequer throwing cold water upon the intrinsic value of the Government's "Victory" War Loan. With Income Tax at five shillings in the pound and excess profits raking in a matter of 80 per cent.—in very many cases, particularly in the aeroplane industry, this means literally 80 per cent. of the entire income less a nominal margin of a couple of hundred pounds—there would surely have been room for accepting the much lauded up "Victory" War Loan scrip as payment for the said Income Tax and Excess Tax respectively, as suggested by Mr. Houston, M.P., in Parliament the other day. But Mr. Bonar Law was taking none of it, either at the issue price or otherwise, in spite of Mr. Houston affirming that many who had patriotically subscribed for the Loan would not be able to meet their Tax commitments to the Treasury unless they liquidated their holdings. But beyond a pious "hope that was not the case" from the Chancellor, there was nothing doing. Wonder what effect this little episode will have when future big-drum pleadings to "Buy, Buy, Buy" more Victory Loans come along?

THERE hardly seem any limitations to the uses to which aviation can be put when an aeroplane to "spot" and track down a murderer is employed by the police authorities. The idea although novel is distinctly practical, and under the peculiar circumstances immediately surrounding the mystery

of Miss Owen's murder at Bricket Wood, might easily have proved to be of immense practical assistance.

THEORETICALLY the dropping of gifts from the sky is an ideal way of capturing the imagination of the young mind, but all the same, a direct hit from a couple of half-crowns can hardly be regarded as the most delicate way of drawing the attention of a recipient to the favours showered upon him. This minor moralising is the outco a report ome off a recent sale of work in aid of the Kew Cot at the Cripples' Home and College, Alton, Hants. At this function Sir William Treloar mentioned that the other day two airmen hovering over the institution saw the children, and dropped a packet. On being picked up it was found to contain two half-crowns. Written on a piece of paper was, "Hope you kiddies enjoyed the sight. —Two little birds." He did not know who the gallant fellows were, but a little cripple the next day asked him to see the King and get him to send another aeroplane.

And may the plane duly make its appearance! But we suggest the "silver from the sky" should materialise through the postman.

THE discovery of that Kadaver business has even upset the barbarian mind of the crime soddened Hun. In defence it is claimed by Herr Zimmermann that *Kadaververtwertungsgesellschaften* does not mean what it says. This only refers to animals' bodies. Anyway, that may still be right, as no doubt the majority of the "bodies" are Germans. Perhaps the simplest way out would be to apologise, if reference to the human body is any worse than *Kada*—well, the same as the above. Our stock of that particular fount won't stand the strain.

## TEN YEARS AGO.

Excerpts from the "Auto." ("FLIGHT's" precursor and sister Journal) of May, 1907. "FLIGHT" was founded in 1908.

### SANTOS DUMONT'S NEW AIRSHIP.

Although in no way intending to abandon his trials with the heavier-than-air type of machine, M. Santos Dumont is evidently of the opinion that he may as well obtain as much fun for his money as possible, for he is having constructed a new airship in which he proposes to make his summer excursions. The gas-vessel of this machine will be of the ordinary double-ended cigar-shape type, measuring not less than 22 metres long, and it will be propelled by a 50 h.p. Antoinette engine. The airship is to embody features which will bring it partly within the aeroplane category, and which will render it, as the French would say, a *système mixte*. In conjunction with the gas vessel there will be aeroplane surfaces, so that when the machine is in motion these will come into effect on the ordinary aeroplane principle.



THE ROYAL VISIT TO BARROW.—At Vickers' works, His Majesty the King was particularly interested in women operating overhead electric cranes.





### Casualties.

Captain **ELDRED WOLFERSTAN BOWYER-BOWER**, East Surrey Regiment and R.F.C., whose death was recorded last week, went to France on May 1st, 1915, and was in all the heavy fighting up to March, 1916, when he was attached to the R.F.C. He remained in France, flying over German lines as an observer, doing excellent work, until August, 1916, when he came home to take his pilot's certificate. Captain Bower flew over to France on February 27th last in charge of a number of planes and was reported "missing" over Hindenburg's line on March 19th, where he was seen to have been attacked by an overwhelming number of enemy machines, which had been hidden in the clouds. Captain Bower's body and that of his observer (Second Lieutenant Eric Elgey, R.F.A. and R.F.C.) have now been found by his own father, Captain T. Bowyer-Bower beside his beriddled machine. He was educated at Wootton Court, near Canterbury, and Haileybury.

Lieutenant **CHARLES COUPLAND**, R.F.A., attached R.F.C., son of the late John Coupland, of Goscote Hall, Leicester, and of Mrs. Coupland, of 16, Connaught Square, W., was killed on May 6th. Born in 1884, he was educated at Stonyhurst and enlisted in the Middlesex Yeomanry, receiving his commission in the 3rd Hussars. He went to the front with the R.F.A., and then joined the R.F.C. as an observer.

Second Lieutenant **NORMAN R. DE POMEROY**, R.F.C. (reported missing on October 20th, 1916, now unofficially reported killed in action on that date), was 24 years of age, and the only son of Mr. Edward W. N. and Mrs. de Pomeroy, of Pantile, Aldington, Kent. He had his commission in the Army in December, 1915, and was gazetted flying officer in September, 1916.

Second Lieutenant **NORMAN WALTER MORRISON**, R.F.C., who was killed on April 14th, was the elder son of Mr. and Mrs. Walter Granville Morrison, of Theydon, Reigate, and was educated at Hillside, Reigate, and Charterhouse (Weekites). He left Charterhouse in December, 1915, obtained his commission in February, 1916, and went to the front in August, 1916. His parents are informed by his squadron captain that Mr. Morrison, who was 19 years of age, was killed while engaged on a very difficult and dangerous piece of work for which he had volunteered.

Second Lieutenant **R. C. OAKES**, R.F.A., attached R.F.C., youngest son of Colonel and Mrs. Oakes, of Nowton Court, Burry St. Edmunds, who was reported missing on July 19th, 1916, is now known to have been killed in an aerial fight on that day. He was educated at Wellington College and Woolwich, and went to the front in May, 1916. His brother, Captain Orbell Oakes, Yorkshire Regiment, fell at Neuve Chapelle in March, 1915.

Second Lieutenant **J. I. M. O'BEIRNE**, Royal Warwickshire Regiment, attached R.F.C., reported missing on April 3rd, and now unofficially reported killed on that day, was the younger son of Major O'Beirne, late Royal Warwickshire Regiment, and Mrs. O'Beirne, of Astrop Grange, near Banbury, and Augherea, county Longford, Ireland, and was 23 years of age. He was educated at Summerfields and Radley College, and had just finished his three years' training at the School of Mining, Camborne, when war broke out. He joined the Special Reserve of Officers in September, 1915, and went to the front, but was invalided home after the first battle of Ypres. Later he went to Sandhurst, and received a commission in the regiment, joined the R.F.C., and went to the front in May, 1916.

Lieutenant **JOSEPH SENIOR**, R.F.C., son of Mr. A. Senior, of the West Riding (Yorks) Treasurer's Department, has died of wounds. He was 24 years of age, had had a brilliant scholastic career, and at the outbreak of war was at Wren's College, London.

Second Lieutenant **J. GUTHRIE TROUP**, Cameronians (Scottish Rifles), killed on May 13th, was the youngest son of the Rev. G. E. Troup, of Broughty Ferry, and was aged 20. He was educated at Seafeld House Preparatory School,

Broughty Ferry, and at Rugby. Joining the Officers' Training Corps at St. Andrews shortly after the outbreak of war, he received his commission in March, 1915. In May of last year he went to the front, and had taken part in much of the fighting. Recently he was attached to the R.F.C., and had been serving in that capacity for the past two months.

Flight Sub-Lieutenant **ERIC B. J. WALTER**, R.N., who was killed on April 24th, aged 19, was the elder son of Lieutenant Walter J. Walter, R.N.V.R., of the Stock Exchange, and late of Chase Cross, Romford, and Bryanston Street, W.C. He was educated at Stubbington, and University College School, and joined the R.N.A.S. on attaining his 18th birthday.

The death at the Front of Captain **ERWIN WENTWORTH WEBSTER**, Fellow of Wadham College, Oxford, is announced. As soon as war broke out he joined the R.F.C., but after a serious accident, due to his defective eyesight, was obliged to give up. He then obtained a commission in the King's Royal Rifles. He had been wounded in 1916, and was ill in hospital at the end of the year. He fell on April 9th, the first day of the victorious British advance. Captain Webster's death is a severe loss not only to his college and many private friends, but to scholarship generally. The only son of that distinguished Spanish scholar, the late Rev. Wentworth Webster, he won a scholarship at Wadham, where he soon distinguished himself as a player of Rugby football and other games. He took a First in Moderations and a brilliant First in Greats, and was at once offered a Fellowship by his college. He possessed a greater knowledge of Basque and of German than perhaps any other Englishman, and was also acquainted with Old German and Old French. He had made a profound study of Aristotle, some of whose more difficult and less familiar treatises he would probably have edited.

Second Lieutenant **ARTHUR CYRIL YOUNG**, aged 19, who gave his life for his country on April 2nd, was the only son of Mr. and Mrs. A. Young, of 5, Purcell Mansions, Queen's Club Gardens, W. Educated at Wallington Grammar School, he, from his boyhood up, made aviation his one absorbing interest and study, desiring above all things to become an airman. On obtaining a commission in the R.F.C., August, 1916, he realised his ambition. He crossed to the front on March 7th.

Flight-Lieutenant **LEWIS MORGAN**, R.N., whose death through an aeroplane accident was announced on May 11th, was the second and only surviving son of Captain and Mrs. L. H. G. Morgan, of Cheddonscote, near Taunton. He was educated on His Majesty's ship "Conway," and obtained his commission in the Royal Naval Reserve in 1908. On the outbreak of war he was appointed to the "Coronid," and served for nine months on the North Atlantic station. Subsequently he was transferred to the Royal Naval Air Service, and secured his pilot's certificate in June, 1915. One of his brother officers at Chingford, where the accident occurred, writes: "He was an eminently skilful and cool pilot; he has made a good many flights I should have been proud of, especially when he was on active service in German East Africa. He made a splendid instructor, because with all his enterprise he was more careful of his pupils' learning to fly straightforwardly and without taking unnecessary risks than any other instructor I have known." His brothers, Captain and Adjutant F. Morgan, R.F.A., 29th Division, and Lieutenant W. B. Morgan, South Lancashire Regiment, both lost their lives in Gallipoli.

Probationary Flight Officer **FRANCIS HOLT YATES TITCOMB**, R.N., who was killed on April 15th while making a cross-country flight in England, was born at St. Ives, Cornwall, in 1898. He was the only son of Mr. and Mrs. W. H. Y. Titcomb, of Clifton, Bristol, and grandson of the late Bishop Titcomb, first Bishop of Rangoon, Burma. He received his early education in the Königliches Hohenzollern Gymnasium at Düsseldorf. He had a distinguished career at Clifton College,



and won a Scholarship in Natural Science at Corpus College, Cambridge. It was his intention from boyhood to devote himself to research work in aviation.

#### Missing.

Captain D. D. SHEEHAN, M.P., has received information from the War Office that his son, Lieutenant D. T. SHEEHAN, R.F.C., is "reported missing." Lieutenant Sheehan was a Midshipman in His Majesty's ship "Hibernia" when the war broke out, and saw service in the North Sea. He was subsequently promoted to the R.N.A.S., saw service in France and elsewhere, and was wounded. Lieutenant Sheehan was invalided for several months, and transferred to the R.F.C.

News has been received by Mr. Bransby Williams, the well-known character actor, that his son, Lieutenant G. W. BRANSBY WILLIAMS is reported missing on the Western Front. Lieutenant Williams, who is an old Dulwich College boy, is 19 years of age, and is attached to the R.F.C. He has been at the Front for nearly two years.

#### Married and to be Married.

The marriage between Flight-Lieutenant HARWOOD ARNOLD, D.S.O., and DOROTHY, daughter of the Rev. Canon and Mrs. G. E. Frewer, of Beaconsfield, Furzehill, Hove, Sussex, will take place quietly next month.

The marriage arranged between Captain M. T. BAINES, R.F.C., and Miss FLORA ALLATINI will take place at St. George's, Hanover Square, on June 14th, at 2.30 p.m.

The engagement is announced between Captain WILLIAM S. FIELDING JOHNSON, M.C., Yeomanry and R.F.C., second son of Mr. and Mrs. Thomas Fielding Johnson, of Goscote Hall, Leicestershire, and GWENDOLEN EDITH, daughter of the late WALTER WHETSTONE, of Shirley Lodge, near Leicester, and Mrs. ERNEST V. HILEY, of Beechfield, Edgbaston; present address, 31, Weymouth Street, Portland Place.

An engagement is announced between Lieutenant HARRY KENT, King's (Liverpool Regiment) and R.F.C., and JESSIE ELAINE, eldest daughter of FARQUHAR DEUCHAR, of Loansdean, Morpeth, Northumberland.

The marriage arranged between Captain R. M. KNOWLES, M.C., Norfolk Regiment and R.F.C., and Miss O. M. BERNERS will take place early in June.

The marriage of Captain JAMES HUMPHREY COTTON MINCHIN, Cameronians and R.F.C., only son of Mr. and Mrs. James Cotton Minchin, The Green, Wimbledon Common, and Miss VIOLET FULLER, third daughter of Mr. and Mrs. CLAUDE FULLER, took place at Holy Trinity Church, Brompton, on May 17th.

The engagement is announced of Miss KATHERINE LEEFE ROBINSON, sister of Captain Leefe Robinson, V.C., to Baron HEYKING, the Russian Consul-General.

The marriage arranged between Lieutenant-Colonel and Wing Commander C. M. WATERLOW, R.N.A.S. and R.E., and Miss JOAN CLARE will take place at 2.30 p.m. at Farnham on Saturday, June 9th.

#### Items.

In the *Berliner Illustrierte Zeitung* appears a photograph of Lieutenant REDBORNE, a British airman, said to have been brought down during the air raid on Freiburg.

The will of the late Captain the Hon. ERIC FOX PITT LUBBOCK, M.C., R.F.C., of Grosvenor Street, S.W., who was killed in action on March 11th, son of the late Lord Avebury, has been proved at £2,076.

The will of Lieutenant JOSEPH SPENCER MITCHELL, R.F.C., of Sandgate House, Wath-upon-Dearne, near Rotherham, who was killed at the Front on October 5th, intestate, has been sworn at £22,241.



## AVIATION IN PARLIAMENT.

#### Timber for Aircraft Factories.

SIR E. LAMB in the House of Commons on May 15th asked the Under-Secretary of State for War whether, having regard to the Cabinet instruction that timber is to be economised, he will explain why timber is still being employed for the extensive external wall surfaces of the various aircraft supply stores now being erected for the Royal Flying Corps in the North-West of London and in various provincial centres; and, having regard to the purpose to which these buildings are to be put, he will consider the advantage of utilising a material of some fire resistance, such as a non-proprietary concrete slabbing, rather than timber weather boarding?

Mr. Macpherson: Fire-resisting material is, as far as possible, being substituted for timber in all buildings in course of construction for the Royal Flying Corps except in cases where the work was nearing completion or the contract too far advanced before the issue of the instruction to which my hon. Friend refers.

#### Freiburg Air Raid.

SIR W. COLLINS asked the First Lord of the Admiralty what were the instructions to the air squadron which conducted the recent reprisal raid on the town of Freiburg?

Dr. Macnamara: Orders were issued jointly by the British and French Governments that Freiburg was to be bombed as an act of reprisal for the sinking of the hospital ship "Asturias," and leaflets were dropped announcing this.

#### Zeebrugge.

MR. PEMBERTON BILLING on May 16th asked the First Lord of the Admiralty whether the officers responsible for the policy which delayed a sustained naval and air offensive at Zeebrugge are the same who were responsible for directing the recent bombardment of that enemy base?

Dr. Macnamara: The hon. Member appears to be endeavouring to develop, in the form of a question, an argument based upon an entirely erroneous premise. It is incorrect to assume that there has been any change in the policy.

Mr. Billing: May I ask the right hon. Gentleman to answer my question in so far as it refers to whether there has been a change in the command that has affected the Naval Air Service operations abroad?

Dr. Macnamara: It is incorrect to assume, as the hon. Member now does again, that there has been any change in policy.

Mr. Billing: I did not say "policy"—in the command?

Dr. Macnamara: Not so far as I know.

Mr. Billing: Is the Vice-Admiral the same?

Dr. Macnamara: I said that there has been no change so far as I know. If the hon. Gentleman wants the matter further elaborated, he must give me notice.

Mr. Houston: Is my right hon. Friend aware that the late First Lord of the Admiralty stated in this House that he refused to make a naval bombardment of Zeebrugge?

#### Armed Seaplanes.

COLONEL C. LOWTHER asked the First Lord of the Admiralty whether he will consider the immediate construction of a number of armed seaplanes specially designed for flying in rough weather at a slow speed and low altitude, for the purpose of meeting incoming food ships within a given radius and conveying them into British ports?

Dr. Macnamara: We have already seaplanes which are capable of undertaking the work which my hon. and gallant Friend suggests, and, in point of fact, have undertaken it as opportunity has arisen.

Mr. Billing: Will the right hon. Gentleman consider the advisability of having regular trade routes for these particular machines to meet these boats, and not leave it to chance?

Dr. Macnamara: I think the hon. Member may well leave this to those who have the work in hand.

#### Captain Ball, R.F.C.

MR. BILLING asked the Under-Secretary of State for War whether he has any information as to the fate of Capt. Ball, D.S.O., R.F.C.; and will he say what type of machine he was flying at the time he was reported missing?

The Under-Secretary of State for War (Mr. Macpherson): I am sorry to say that the War Office has no further information about the fate of this gallant officer. It is not considered desirable to mention the type of machine which he was using.

Mr. Billing: Is it not a fact that this officer requested continually not to be forced to cross the line on this particular type and design of machine, and that the 42 German machines he brought down were in nearly every case with a privately-designed machine, and the first time he was sent over on this other type he was lost?

Mr. Macpherson: I can scarcely believe that could be true. I know that this gallant officer never questioned any orders that were given.

Sir H. Dalziel: Is there any ground for hope that he is still alive?

Mr. Macpherson: We hope he is still alive.

Mr. Pringle: Will the hon. Gentleman make inquiries into the allegations made by the hon. Member (Mr. Billing)?

Admiral of the Fleet Sir H. Meux: Because this gallant officer would not refuse to obey any orders, should we not be the more careful not to give him bad orders?

Mr. Macpherson: I understand that no complaint has ever been received of him ever having had bad orders.

Mr. Pringle: That is the allegation.

Sir H. Meux: The hon. Member (Mr. Billing) has made a complaint.

#### Commercial Aeronautics.

MR. BILLING asked the Prime Minister whether it is proposed to include in the new Air Committee, formed to consider the development of our Air Services for mail and commercial purposes after the War, representatives from recognised aeronautical and commercial institutions; and, if so, what steps are being taken to this end?

The Parliamentary Secretary to the Air Board (Major Baird): The Prime Minister has asked me to answer this question. The composition of this Committee, which will be announced at an early date, will, I think, be found to be fully representative for the purpose of considering, in all their aspects, the questions involved in the reference.

#### Damage by Aeroplanes (Compensation).

MR. WILSON-FOX on May 17th asked the Parliamentary Representative of the Air Board, whether he is now in a position to state if claims for compensation will be entertained in respect of damage done to fences or buildings in the United Kingdom by aeroplanes of our own force?

Mr. Forster: My hon. and gallant Friend has asked me to reply to this. The matter is still under consideration, but I am taking steps to expedite a settlement.

#### Air Services and Criticism.

MR. BILLING on May 21st asked the Under-Secretary of State for War whether an Army Order or any other Order has been issued by the authorities at home or abroad forbidding officers or men of the R.F.C. or any other portion of the Army to criticise or comment upon the B.E.8 biplane; if so, whether this Order refers to the B.E.8's in use at home as well as abroad; whether this Order has been issued because the inherent defects of this type of aeroplane make it particularly liable to criticism; whether a brigade Order has been issued to any brigade of the R.F.C. in France forbidding officers to criticise the aeroplane on which they are mounted; and whether, in such an Order, officers have been warned that their remarks may be distorted by critics of the R.F.C. through ignorance or malice.

Mr. Macpherson: No Order has been given at home or abroad forbidding officers and men of the R.F.C. or any other portion of the Army to criticise or comment upon aeroplanes. Criticism and gossip about new types of aeroplanes, of which the critics have no real experience, is discouraged. This policy has been justified in the case of the R.E.8, which was criticised on its introduction, but is now in much request by Artillery squadrons.



# The British Air Service

"PER ARDUA AD ASTRA"

UNDER this heading are published each week the official announcements of appointments and promotions affecting the Royal Naval Air Service and the Royal Flying Corps (Military Wing) and Central Flying School. These notices are not duplicated. By way of instance, when an appointment to the Royal Naval Air Service is announced by the Admiralty it is published forthwith, but subsequently, when it appears in the LONDON GAZETTE, it is not repeated in this column.

## Royal Naval Air Service.

Admiralty, May 15th.

The following prob. Flight Officers (temp.) promoted to rank of Flight Sub-Lieut., seniority as follows:—J. H. W. Clarke; Jan. 10th. G. F. Moody and W. L. Jordan; both Jan. 18th. W. F. Dickson; Jan. 24th. C. L. Nightingale; Jan. 31st. J. S. A. Ferguson and R. M. Stirling, both Feb. 4th. R. B. Picken; Feb. 8th. F. G. Horstmann; Feb. 14th. W. R. Curtis, E. J. Addis, and P. C. Cressman; all Feb. 25th. J. M. McCleery and J. F. Nalder; both Mar. 3rd. D. E. Penney; Mar. 18th. P. F. T. Luckham; Mar. 28th. H. C. Arnold and C. G. Brock, both April 4th; and P. C. Richards, April 11th.

J. S. J. Craigen, entered as Prob. Flight Officer (temp.), seniority May 6th, and appointed to "President," for R.N.A.S.

Temporary commissions, R.N.V.R., granted to the following, seniority as follows, and all appointed to "President," for R.N.A.S.:—Lieuts.—C. Harris, D. C. Swan, E. I. Sycamore, and C. Heath; all May 14th. Sub-Lieut.—A. C. Snow; Feb. 23rd.

Admiralty, May 17th.

Probationary Flight Officer.—M. O. F. England, appointed Observer Sub-Lieut. (R.N.), seniority July 29th, 1916.

Lieutenant-Commander (R.N.V.R.).—F. W. Belt, promoted to Act. Comdr. (temp.), seniority May 15th.

Lieutenant (Temporary R.N.V.R.).—W. F. Watson, transferred to R.N.A.S.; May 16th.

Sub-Lieutenants (Temporary, R.N.V.R.).—N. Fawkes, B. H. Bluet, and W. Venables, all transferred to R.N.A.S.; May 16th.

Assistant Paymaster (R.N.).—W. S. Magrath, graded as Prob. Flight-Lieut., seniority May 21st.

The following entries have been made:—Sub-Lieut. (Temp., R.N.V.R.).—D. R. C. Wright, as Prob. Flight Sub-Lieut., seniority Oct. 21st, 1916. Sergt. (H.A.C.) W. J. Pullen and Pte. (H.A.C.) H. Wicket, both as Prob. Flight Officers (temp.), seniority May 4th; and P.O. M. W. Moffatt, as Prob. Observer Officer, seniority May 18th.

Admiralty, May 21st.

Lieutenant-Commander (R.N.R.).—O. H. K. Maguire (retd.) appointed Act. Comdr., seniority May 18th.

Warrant Officer (Temporary, 2nd Grade).—H. H. Stone, granted a temp. commission as Lieut. (R.N.V.R.), seniority May 17th.

Mr. H. K. Dudley-Scott entered as Prob. Flight Officer (temp.), seniority, May 19th.

## Royal Flying Corps (Military Wing).

London Gazette, May 15th.

Flight Commanders.—From Flying Officers, and to be Temp. Capt. whilst so employed:—Temp. Lieut. A. T. Hope, Gen. List; April 30th. 2nd Lieut. S. W. Taylor, S.R.; May 2nd.

Flying Officers (Observers).—Temp. 2nd Lieut. (on prob.) G. H. Bennett, Gen. List; Nov. 15th, 1916, seniority Oct. 15th, 1916. 2nd Lieut. H. F. Knight, Ind. Army Res. of Off.; Feb. 8th, seniority Oct. 30th, 1916. Lieut. S. G. Progle, R. Berks. R., S.R.; April 27th, seniority Oct. 31st, 1916. Temp. Lieut. F. R. Cook, Garr. Bn., E. York R., and to be transf'd. to Gen. List; Feb. 8th, seniority Dec. 15th, 1916. Lieut. L. H. Kennedy, Canadian Res. Bn.; April 25th, seniority Mar. 25th, 1917. 2nd Lieut. V. S. Rowbotham, R.F.A., S.R., seniority Jan. 9th. 2nd Lieut. C. G. Stewart, R. Sc. Fus., seniority Jan. 15th, and to be sec'd. Temp. 2nd Lieut. F. C. Gorrige, Gen. List, seniority Jan. 16th; April 27th. Temp. 2nd Lieut. (on prob.) H. W. Craig, R.E.; April 3rd, seniority Jan. 28th. 2nd Lieut. (Actg. Lieut.) G. C. Smith, M.C., A.S.C., seniority Feb. 4th, and to be sec'd. Temp. 2nd Lieut. R. C. Jenkins, Gen. List, seniority Feb. 8th; April 27th.

Balloon Commanders. (Graded as Balloon Officers.—From Balloon Officers, and to be Temp. Lieuts. whilst so employed:—2nd Lieut. J. H. Inskip, S.R.; Temp. 2nd Lieut. F. B. Stevens, Gen. List; April 26th.

Equipment Officer, 1st Class.—Lieut. G. C. Gold, S.R., from 2nd Cl., and to be Temp. Capt. whilst so employed; April 1st.

Supplementary to Regular Corps.—2nd Lieut. O. B. Howell resigns his commission; May 16th.

London Gazette Supplement, May 16th.

Flying Officers.—2nd Lieut. (Temp. Lieut.) S. Baker, E. Kent R. (T.F.), and to be sec'd.; Mar. 31st. Temp. Capt. H. R. Coninsby, Midd'x. R., from a Flying Officer (Ob.); April 7th, seniority Aug. 1st, 1916. Lieut. A. Leslie-Moore, Ind. Army Res. of Officers; April 8th. 2nd Lieut. (on prob.) J. R. F. Gubbin, S.R.; April 9th. 2nd Lieut. J. N. Wilkinson, R.E. (T.F.), from a Flying Officer (Ob.); April 12th, seniority Sept. 22nd, 1916. 2nd Lieut. (Temp. Lieut.) F. Hodgson, North'd Fus. (T.F.), and to be sec'd.; April 16th. Temp. 2nd Lieut. (on prob.) H. W. Elliott, Gen. List; Temp. 2nd Lieut. (on prob.) C. Pern, Gen. List; 2nd Lieut. G. F. Court, Essex R. (T.F.), and to be sec'd.; April 22nd. Temp. 2nd Lieut. B. Yandell, attd. Manch. R., and to be transf'd. to Gen. List; 2nd Lieut. (on prob.) G. E. Creighton, Spec. Res.; Temp. 2nd Lieut. T. B. Tully, Gen. List; April 23rd. Temp. 2nd Lieut. (on prob.) D. H. Sessions, Gen. List; Capt. A. A. Greenslade, S. Lan. R., S.R., and to be sec'd.; Lieut. S. H. Clarke, M.C., Wilts R., S.R., from a Flying Officer (Ob.); Mar. 20th, 1916. Temp. Lieut. C. Pilkington, Shrops. L.I., from a Flying Officer (Ob.), seniority April 16th, 1916; Temp. 2nd Lieut. J. L. Barlow, Gen. List; Capt. A. R. Fairbairn, Canadian Inf.; 2nd Lieut. D. J. G. Webb, D. of Corn. L.I., and to be sec'd.; Temp. 2nd Lieut. (on prob.) F. Fenwick, Gen. List; Temp. 2nd Lieut. (on prob.) J. L. Walton, Gen. List; 2nd Lieut. (on prob.) R. S. G. Maclean, S.R.; Temp. 2nd Lieut. (on prob.) H. J. Edwards, Gen. List; Lieut. J. C. Bush, M.C., Dorset R., from Temp. Capt., Gen. List, and to be sec'd.; Temp. 2nd Lieut. H. E. Kirk, attd. Suff. R., and to be transf'd. to Gen. List; Temp. 2nd Lieut. (on prob.) S. Smith, attd. Lan. Fus., and to be transf'd. to Gen. List; Temp. 2nd Lieut. (on prob.) T. W. Abbott, Gen. List; April 24th; 2nd Lieut. W. Helmore, R.A., from a Flying Officer (Ob.), seniority July 3rd, 1916; 2nd Lieut. (on prob.) D. Leishman, S.R.; Temp. 2nd Lieut. (on prob.) E. W. Morris, Gen. List; 2nd Lieut. (on prob.) G. I. D. Marks, S.R.; Lieut. (Temp. Capt.) P. C. Cowan, Manch. R. (T.F.), and to be sec'd.; Temp. 2nd Lieut. (on prob.) E. D. Whittles, Gen. List; 2nd Lieut. (on prob.) A. MacN. Denovan, S.R.; Temp. 2nd Lieut. (on prob.) A. J. P. Hyth, Gen. List; Lieut. R. F. S. Mauduit, D. Gds., and to be sec'd.; 2nd Lieut. C. D. Thompson, H.A.C. (T.F.) from a Flying Officer (Ob.), seniority June 24th, 1916; 2nd Lieut. (Temp. Lieut.) F. H. Holmes, R.E. (T.F.), and to be sec'd.; 2nd Lieut. (Temp. Lieut.) J. H. Jephson, R.G.A. (T.F.), and to be sec'd.; April 25th. 2nd Lieut. P. Goodbehere, Manch. R. (T.F.); 2nd Lieut. (Temp. Lieut.) R. D. Coath, Yeo, and to be sec'd.; Lieut. H. C. Higginbotham, Arg. and

Suth'd. Highrs., S.R., and to be sec'd.; 2nd Lieut. B. K. B. Barber, North'd. Fus., from a Flying Officer (Ob.), seniority Mar. 5th, 1916; Temp. 2nd Lieut. (on prob.) W. G. Morgan, Gen. List; Temp. 2nd Lieut. E. C. Goldsworthy, Gen. List; April 26th. 2nd Lieut. A. W. R. Matthews, A. Cyclist Corps, and to be transf'd. to Gen. List; 2nd Lieut. A. E. Hedges, York and Lanc. R. (T.F.), and to be sec'd.; 2nd Lieut. J. C. Preston, Bedf. R., and to be sec'd.; 2nd Lieut. (on prob.) W. R. Keast, S.R.; Temp. 2nd Lieut. (on prob.) D. Latimer, Gen. List; Temp. 2nd Lieut. (on prob.) C. L. Adamson, Gen. List; Temp. 2nd Lieut. (on prob.) M. Lowe, Gen. List; April 27th.

Flying Officers (Observers).—Temp. 2nd Lieut. (on prob.) E. W. Swann, Gen. List, seniority Dec. 19th, 1916; 2nd Lieut. H. McL. Ferguson, R.F.A., S.R., seniority Jan. 10th; Lieut. A. R. W. Curtis, Hrs., S.R.; Lieut. L. de S. Duke, Canadian Gen. List; Temp. 2nd Lieut. W. A. Amor, Gen. List; Temp. 2nd Lieut. (on prob.) C. T. E. Smith, Gen. List, seniority Feb. 3rd; Temp. 2nd Lieut. A. Hutchison, Gen. List; Temp. 2nd Lieut. C. J. S. Dearlove, Gen. List; Temp. 2nd Lieut. (on prob.) J. H. Westlake, Gen. List, seniority Feb. 24th; April 28th. 2nd Lieut. M. D. R. Paton, Lond. R. (T.F.), seniority Jan. 26th, and to be sec'd.; 2nd Lieut. A. G. R. Mackenzie, R.F.A., S.R., seniority Jan. 27th (April 29th); and Lieut. J. G. Troup, Sco. Rif. (T.F.), and to be sec'd.; 2nd Lieut. W. E. Watt, King Edward's Horse, S.R., and to be sec'd.; April 29th, seniority Jan. 28th. Temp. 2nd Lieut. J. Douglas, R.E. seniority Jan. 29th; 2nd Lieut. D. McC. Martin, High. L.I. (T.F.), seniority Feb. 9th, and to be sec'd.; 2nd Lieut. (Temp. Capt.) J. H. Halliwell, L'pool. R. (T.F.), seniority Feb. 12th, and to be sec'd.; April 29th. Temp. 2nd Lieut. R. W. Spooner, R.A., and to be transf'd. to Gen. List; 2nd Lieut. R. R. Gyles, R.A., and to be sec'd.; April 29th, seniority Feb. 15th.

Balloon Officer.—2nd Lieut. J. P. Nickalls, R.A., and to be sec'd.; April 30th.

Equipment Officers, 2nd Class.—Lieut. (Temp. Capt.) A. Heywood, S.R., reverts from 1st Cl., and relinquishes his temp. rank; April 30th.

3rd Class.—2nd Lieut. (on prob.) H. H. Hussey, S.R.; Mar. 27th.

London Gazette Supplement, May 17th.

Flying Officers.—Temp. Lieut. F. G. Pearson, Gen. List, from a Flying Officer (Ob.); April 19th, seniority May 17th, 1916. Temp. 2nd Lieut. (on prob.) G. N. Hunstone, Gen. List; 2nd Lieut. R. M. Harris, York. R., and to be sec'd.; Temp. 2nd Lieut. (on prob.) L. A. Rivers, Gen. List; April 20th. Temp. 2nd Lieut. (on prob.) M. S. Goodban, attd. E. Surr. R., and to be transf'd. to Gen. List; Temp. 2nd Lieut. (Temp. Lieut.) G. M. Goode, Gen. List, from an Equipment Officer, 3rd Cl.; April 21. Lieut. F. A. Loosley, Canadian Inf.; Temp. 2nd Lieut. D. R. Cameron, A.S.C., and to be transf'd. to Gen. List; Temp. 2nd Lieut. R. S. Davies, Gen. List; Temp. 2nd Lieut. (on prob.) H. E. Waters, Gen. List, April 22nd. Maj. E. G. Joy, Canadian Inf.; Temp. Lieut. C. G. Mathew, A.S.C., and to be transf'd. to Gen. List; 2nd Lieut. (Temp. Lieut.) J. L. S. Gill, Lan. Fus. (T.F.), and to be sec'd.; Temp. 2nd Lieut. E. Carpenter, attd. Worc. R. and to be transf'd. to Gen. List; 2nd Lieut. W. P. Scott, S.R.; Temp. 2nd Lieut. D. Langlands, Gen. List, from a Flying Officer (Ob.), seniority Mar. 14th, 1916; April 23rd. Temp. 2nd Lieut. (on prob.) D. J. Barnes, Gen. List; Temp. Capt. R. E. Saul, Gen. List, from a Flying Officer (Ob.), seniority June 5th, 1916; 2nd Lieut. (Temp. Lieut.) E. Y. Hughes, R.F.A. (T.F.), and to be sec'd.; Temp. 2nd Lieut. (on prob.) A. G. Platt, Gen. List, April 24th; 2nd Lieut. E. K. Robins, E. Surr. R., S.R., and to be sec'd.; Temp. Capt. T. W. M. Cameron, attd. High. L.I., and to be transf'd. to Gen. List, April 25th; Lieut. A. H. Goldie, Bedf. R., from a Flying Officer (Ob.), seniority Oct. 21st, 1915; 2nd Lieut. R. G. Jardine, S.R.; Temp. 2nd Lieut. (on prob.) E. Mull, Gen. List; Temp. Lieut. T. C. Noakes, York and Lanc. R., and to be transf'd. to Gen. List; 2nd Lieut. (Temp. Lieut.) W. G. Thompson, Suff. R. (T.F.), and to be sec'd.; 2nd Lieut. J. P. Moir, R.E. (T.F.), and to be sec'd.; Temp. 2nd Lieut. (on prob.) B. Strachan, Gen. List; 2nd Lieut. T. St. G. Caulfield, R. Innis, Fus., and to be sec'd.; 2nd Lieut. (on prob.) R. L. M. Ferrie, S.R.; April 26th; Lieut. (Temp. Capt.) C. K. Robinson, Midd'x. R. (T.F.), and to be sec'd.; Temp. Lieut. S. N. S. Kennedy, attd. Bedf. R., and to be transf'd. to Gen. List; Temp. 2nd Lieut. W. Birch, Gen. List, from a Flying Officer (Ob.), seniority July 1st, 1916; 2nd Lieut. J. M. Woods, N. Lan. R. (T.F.), and to be sec'd.; 2nd Lieut. (Temp. Lieut.) W. F. Scott-Kerr, Yeo. (T.F.), and to be sec'd.; 2nd Lieut. J. S. Brydon, S.R.; Capt. R. W. Dawes, N. Staff. R. (T.F.), and to be sec'd.; Temp. Lieut. F. O. Soden, S. Staff. R., and to be transf'd. to Gen. List; Temp. 2nd Lieut. L. Taylor, Gen. List, from a Flying Officer (Ob.), seniority May 7th, 1916; Temp. 2nd Lieut. (on prob.) S. V. L. Gedge, Gen. List; April 27th. Capt. W. S. F. Johnson, M.C. Yeo. (T.F.), from a Flying Officer (Ob.), seniority Dec. 19th, 1916; Lieut. A. Claydon, Canadian Art.; 2nd Lieut. E. H. Pember, R.F.A., S.R.; 2nd Lieut. (on prob.) J. C. Foden, S.R.; April 29th.

Flying Officers (Observers).—Temp. 2nd Lieut. L. R. Brereton, Gen. List, seniority Jan. 2nd; Temp. 2nd Lieut. N. H. de V. Heathcote, Gen. List, seniority Jan. 4th; 2nd Lieut. W. A. Hunter, Yorks. L.I., seniority Jan. 29th, and to be sec'd.; 2nd Lieut. L. C. Davies, M.C., Sco. Rif. (T.F.), seniority Feb. 9th, and to be sec'd.; May 1st. Temp. 2nd Lieut. R. W. Langmaid, Lan. Fus., and to be transf'd. to Gen. List; and Temp. 2nd Lieut. (on prob.) R. de R. Brett, Gen. List, seniority Mar. 8th; May 1st.

Equipment Officers, 1st Class.—Lieut. G. Somers-Clarke, S.R., from the 2nd Cl., and to be Temp. Capt. whilst so employed; April 28th.

2nd Class.—Temp. Capt. L. M. Lilley, Gen. List, from 3rd Cl.; May 1st.

3rd Class.—2nd Lieut. D. S. Parsons, R. W. Surr. R., S.R., and to be sec'd.; Mar. 9th. 2nd Lieut. R. Neilson, S.R.; 2nd Lieut. J. S. V. Stephen, S.R.; Mar. 13th. 2nd Lieut. C. J. Couchman, S.R.; Mar. 16th. Capt. T. I. Walker, Lond. R. (T.F.), and to be sec'd.; May 1st. Temp. 2nd Lieut. W. W. Gibson, Gen. List; May 4th.

Sub-Lieutenants from R.N.V.R., to be Temporary Lieutenants for duty with R.F.C.—E. W. White; April 16th. L. E. G. Hawkins; April 24th. Flight Sub-Lieut. C. L. E. Geach, from R.N.A.S., to be Temp. Lieut. for duty with R.F.C.; April 27th, seniority July 28th, 1915.

Sgt.-Maj. W. W. Gibson, from R.F.C., to be Temp. 2nd Lieut., for duty with the Mil. Wing of that Corps; May 4th.

Supplementary to Regular Corps.—2nd Lieuts. (on prob.) are confirmed in their rank.—A. G. Walwyn, R. G. Hamilton, J. S. Brydon, G. E. Creighton, W. W. Hammond, H. H. Hussey, R. G. Jardine, A. W. Judge, D. Leishman, G. I. D. Marks, W. P. Scott; F. Mayer to be 2nd Lieut., April 29th. To be 2nd Lieuts. (on prob.)—C. Boyd, B. H. Davies, A. C. B. Hanbury, C. E. Power, W. R. Rhodes, R. Trewby; May 4th.

London Gazette, May 18th.

Flight Commanders.—From Flying Officer, and to be Temp. Capt. whilst so employed:—Lieut. I. M. Matheson, Sea. Highrs. S.R.; Dec. 2nd, 1916.



2nd Lieut. W. E. L. Seward, S.R.; May 2nd. From Flying Officers:—Capt. G. H. B. McCall, S.R.; May 2nd. Temp. Lieut. P. J. V. Lavarack, Gen. List, and to be Temp. Capt. whilst so employed; May 4th.

**Flying Officers.**—2nd Lieut. (Temp. Lieut.) M. A. Lillis, R. Ir. R. (since killed in action), from a Flying Officer (Ob.); Jan. 23rd, seniority Jan. 24th 1916. Temp. Capt. W. H. Haynes, attd. York R., and to be transf'd. to Gen. List; April 23rd. Temp. Lieut. L. E. G. Hawkins, Gen. List; April 24th. Lieut. J. C. L. Barnett, Oxf. and Bucks L.I. (T.F.), and to be sec'd.; Temp. 2nd Lieut. (on prob.) F. N. Clark, Gen. List; April 25th. Lieut. A. P. D. Hill, R.A., from a Flying Officer (Ob.); June 1st, 1916. Lieut. R. Spiers, Sco. Rif. (T.F.), from a Flying Officer (Ob.), seniority July 9th, 1916; 2nd Lieut. A. G. Walwyn, S.R., April 26th. 2nd Lieut. (on prob.) H. O. McDonald, S.R.; Temp. 2nd Lieut. C. H. Drew, Gen. List; Temp. Lieut. C. L. E. Geach, Gen. List, seniority July 28th, 1915; April 27th. 2nd Lieut. R. G. Hamilton, S.R.; Temp. 2nd Lieut. (on prob.) E. R. Taylor, Gen. List; April 28th.

**Flying Officers (Observers).**—Temp. 2nd Lieut. E. H. Lascelles, K.R. Rif. C. and to be transf'd. to Gen. List; Nov. 15th, 1916, to April 7th, seniority June 16th 1916. Lieut. W. C. Rowe, Oxf. and Bucks L.I. S.R., seniority Jan. 25th, and to be sec'd.; Temp. 2nd Lieut. (on prob.) B. F. Sandy, Gen. List, seniority Mar. 8th; Lieut. T. W. McConkey, Canadian Inf., seniority Mar. 20th; May 2nd.

**Adjutant.**—Temp. Capt. C. R. Cox, R. Suss. R., since died of wounds, from Mar. 5th to April 13th.

**Equipment Officers, 1st Class.**—From the 2nd Class.—2nd Lieut. (Temp. Capt.) N. M. Halcombe, R.E. (T.F.), and to retain his temp. rank whilst so employed, Feb. 3rd; Qr.-Mr. and Hon. Maj. J. Liddle, (T.F. Res.) and to be Temp. Capt. whilst so employed, Mar. 27th.

**3rd Class.**—Temp. 2nd Lieut. A. E. Abell, Gen. List; Mar. 31st.

**Supplementary to Regular Corps.**—2nd Lieut. D. Brooks relinquishes his commission on account of ill-health; May 19th. 2nd Lieut. (on prob.) F. C. Pratt resigns his commission; May 19th.

#### London Gazette Supplement, May 19th.

**Flying Officers.**—Local Lieut. C. L. White, Egyptian Labour Corps, and to be Temp. Lieut., Gen. List, whilst so employed; Dec. 15th, 1916. Temp. Lieut. E. J. Grou, Gen. List; Temp. 2nd Lieut. (on prob.) R. Harris, Gen. List; April 24th; Temp. 2nd Lieut. (on prob.) R. R. Macintosh, attd. R. Sc. Fus., and to be transf'd. to Gen. List; 2nd Lieut. (on prob.) W. W. Rogers, S.R.; Temp. 2nd Lieut. (on prob.) L. A. McPherson, Gen. List; Temp. 2nd Lieut. (on prob.) F. P. D. Scott, Gen. List; 2nd Lieut. R. U. Phalen, S.R.; Temp. 2nd Lieut. (Temp. Lieut.) H. H. James, Gen. List, from a Flying Officer (Ob.), seniority July 1st, 1916; Lieut. H. M. Yeatman (Wilts R.), S.R., from a Flying Officer (Ob.), seniority July 10th, 1916; April 25th. Temp. 2nd Lieut. (on prob.) E. D. Haller, Gen. List; April 26th. 2nd Lieut. H. A. Smith, Midd'x R. (T.F.), and to be sec'd.; Temp. 2nd Lieut. (on prob.) W. H. Stevenson, Gen. List; Temp. 2nd Lieut. (on prob.) H. P. Ledger, Gen. List; April 27th. 2nd Lieut. (Temp. Lieut.) W. Russell, R.E. (T.F.), and to be sec'd.; Lieut. R. G. Masson, Canadian Inf.; 2nd Lieut. W. L. Lovell, R. W. Kent R., and to be sec'd.; April 28th. 2nd Lieut. (on prob.) C. B. Fisher, S.R.; 2nd Lieut. (Temp. Lieut.) N. Boucher, R. W. Kent R. (T.F.), and to be sec'd.; 2nd Lieut. (Temp. Lieut.) E. Golding, A.S.C. (T.F.); April 29th. Temp. 2nd Lieut. (on prob.) G. V. Howard, Gen. List; 2nd Lieut. A. V. Shirley, Yeo. (T.F.), from Mach. Gun Corps, April 30th. 2nd Lieut. C. F. A. Ley, Yeo. (T.F.), and to be sec'd.; May 1st. The appointment of Temp. 2nd Lieut. G. C. Dell-Clarke, Gen. List, notified in *Gazette* of Aug. 25th, 1916, is antedated to May 20th, 1916.

**Equipment Officer, 3rd Class.**—2nd Lieut. T. J. Hudson, Gen. List; April 1st. **Memorandum.**—Sub-Lieut. E. J. Grou, from R.N.V.R., to be Temp. Lieut. for duty with R.F.C.; April 24th.

**Supplementary to Regular Corps.**—2nd Lieuts. to be Lieuts.:—(Temp. Lieut.-Col.) C. H. Whittington; April 10th. (Temp. Maj.) C. Jarrott; April 18th.

**Lieutenants to be Captains.**—(Temp. Lieut.-Col.) C. H. Whittington; (Temp. Maj.) C. Jarrott; April 20th.

#### London Gazette Supplement, May 21st.

**Flying Officers.**—Temp. 2nd Lieut. G. A. Maclean, Gen. List; Feb. 27th. Lieut. E. W. White, Gen. List; April 16th. Temp. 2nd Lieut. N. M. Irvine, attd. Arg. and Suth'd. Highrs., and to be transf'd. to Gen. List; April 17th. Temp. 2nd Lieut. G. Higginbottom, Gen. List; April 21st. Temp. 2nd Lieut. S. L. Nichols, Gen. List; April 25th. Temp. Lieut. M. A. Doyle, R.E.; Temp. Lieut. H. V. Robins, M.C., K.R. Rif. C., and to be transf'd. to Gen. List; April 26th. Temp. 2nd Lieut. H. Scandrett, Gen. List, from a Flying Officer (Ob.), with seniority from Aug. 7th, 1916; Temp. 2nd Lieut. (on prob.) T. M. Sturges, Gen. List; April 27th. Lieut. G. R. Carmichael, Canadian Ex. Force; Temp. 2nd Lieut. W. G. Ryan, R. Ir. Rif., and to be transf'd. to Gen. List; Temp.

2nd Lieut. D. H. Rudd, R.A., and to be transf'd. to Gen. List; April 29th. 2nd Lieut. J. W. Gillespie, S.R.; 2nd Lieut. (on prob.) R. S. Bennie, S.R.; Temp. 2nd Lieut. (on prob.) L. M. Shadwell, Gen. List; Temp. 2nd Lieut. C. L. Green, Essex R., and to be transf'd. to Gen. List; 2nd Lieut. C. D. Pyne, K.R. Rif. C., and to be sec'd.; Temp. 2nd Lieut. H. P. Rickard, Gen. List; Capt. J. S. Bush, Som. L.I., S.R., from a Flying Officer (Ob.), seniority Nov. 8th, 1915; Temp. 2nd Lieut. L. P. Hoult, attd. Hamps. R., and to be transf'd. to Gen. List; 2nd Lieut. C. R. J. Thompson, S.R.; 2nd Lieut. G. F. Delm Williamson, R. Highrs., and to be sec'd.; Temp. 2nd Lieut. (on prob.) E. E. Arbery, Gen. List; Temp. 2nd Lieut. (on prob.) H. H. Deering, Gen. List; April 30th. Lieut. N. P. Tucker, Ind. Army Res. of Off.; Lieut. W. E. McKissock, Canadian Gen. List; 2nd Lieut. (on prob.) J. M. Allport, S.R.; May 1st. Temp. 2nd Lieut. E. H. Lascelles, Gen. List, whose appointment was notified in *Gazette* of May 2nd, to take seniority June 16th, 1916.

**Flying Officers (Observers).**—Temp. 2nd Lieut. A. W. Stevenson, Notts. and Derby R., seniority Nov. 25th, 1916, and to be transf'd. to Gen. List; Temp. 2nd Lieut. (on prob.) F. Tingle, R. Scots, seniority Jan. 23rd, and to be transf'd. to Gen. List; Temp. 2nd Lieut. (Actg. Lieut.) L. A. Rushbrooke, R.A., seniority Jan. 28th, to relinquish his actg. rank, and to be transf'd. to Gen. List; 2nd Lieut. M. Tod, R. Highrs.; Jan. 29th, and to be sec'd. Lieut. H. A. Driscoll, Canadian Inf., seniority Jan. 31st; May 3rd. 2nd Lieut. G. P. U. Hardy, R.A., and to be sec'd., and 2nd Lieut. J. B. Henry, R. Innis. Fus., S.R., and to be sec'd.; May 3rd, seniority Feb. 12th. 2nd Lieut. F. J. Kydd, L'pool. R. (T.F.), and to be sec'd.; May 3rd, seniority Feb. 15th.

**Equipment Officers, 3rd Class.**—2nd Lieut. G. N. J. Shaw, S.R.; Feb. 20th. 2nd Lieut. J. L'Estrange, S.R.; Feb. 22nd. 2nd Lieut. (on prob.) E. O. Byam, S.R.; Mar. 3rd. 2nd Lieut. (on prob.) T. A. Peddell, S.R.; April 13th. 2nd Lieut. W. W. Hammond, S.R.; April 26th. 2nd Lieut. (on prob.) G. F. Allison, S.R.; April 30th.

#### Schools of Mil. Aeronautics.

**Inspector of Technical Training (graded as a Park Commander).**—Temp. Capt. L. Sadler, A.S.C., an Equipment Officer, 1st Cl., and to be Temp. Maj. while so employed, vice Temp. Maj. A. E. G. MacCallum, Gen. List; April 10th.

#### Wireless and Observers' School.

**Commandant (graded as a Wing Commander).**—Capt. (Temp. Maj.) J. A. Chamier, D.S.O., Ind. Army, a Sqdn. Comdr., and to be Temp. Lieut.-Col. whilst so employed; April 29th.

**Assistant Commandant.**—Lieut. (Temp. Maj.) H. A. Oxenham, M.C., S.R., to retain his present grading as a Park Comdr. and temp. rank of Maj. while so employed; April 29th.

**Memoranda.**—Flight Sgts., from R.F.C., to be Temp. 2nd Lieuts. for duty with the Mil. Wing of that Corps.—G. Higginbottom; April 21st. S. L. Nichols; April 25th. To be Temp. 2nd Lieuts. (on prob.) for duty with R.F.C.:—Sgt. J. H. Glew, from R.F.C.; Mar. 11th. G. P. Robertson, late Lieut. R.N.V.R.; April 26th. J. T. Vernon; May 5th. T. K. Jones; May 7th.

**Supplementary to Regular Corps.**—2nd Lieut. (on prob.) G. D. Thane-Parker is cashiered by sentence of a Gen. Court-Martial; April 28th. Notification in *Gazette* of May 4th of appointment of following 2nd Lieuts. (on prob.) is cancelled:—R. K. Armstrong, H. L. Shepherd. Christian names of 2nd Lieut. (on prob.) George Edward Thomas are as now described, and not as in *Gazette* of April 16th. 2nd Lieuts. (on prob.) are confirmed in their rank:—R. S. G. MacLean, G. N. J. Shaw, S. R. J. Thompson, J. L'Estrange, E. D. C. Herne, J. W. Gillespie, R. L. M. Ferrie, H. O. McDonald, C. B. Fisher, A. M. Donovan, W. W. Rogers, J. R. F. Gubbin, R. U. Phalen. E. E. N. Smith to be 2nd Lieut. (on prob.); Mar. 17th.

#### Royal Flying Corps (Territorial Force).

##### London Gazette Supplement, May 21st.

C. L. Cleburne (late Lieut., Lond. R.) to be Lieut. (Temp.); May 22nd.

#### Aeronautical Inspection Department.

##### London Gazette Supplement, May 17th.

To be Temporary Hon. Lieutenants (without Army pay or allowances) whilst employed as Assistant Inspectors, Aeronautical Inspection Department.—E. Crowe, H. S. Burdett, H. P. Dickenson, H. T. Wright, A. Barnard, C. J. Lyth, A. R. Densley, C. V. Brearey, G. R. Groves, W. E. Rogan, H. Longton, R. W. Fieldwick, R. J. Ward, E. H. Henderson, J. Smeaton, H. A. Thomson, R. W. Kennedy, J. D. Parkes, W. J. Parkinson, J. H. Paton, C. E. Marshall, H. Bedson, F. A. Crouch, H. F. Howell, E. W. Short, F. C. L. Brendel, H. J. S. Ferry, W. B. Gullen, A. Johnson, H. L. Tomlinson, E. L. Ransome, M. C. Boff; April 1st. C. G. Whinfrey; April 21st.

## A Resourceful British Officer.

MENTION was made in the *Journal Officiel* of May 15th of Lieut. K. B. Burburly, an observation officer employed with a captive balloon attached to the Fourth British Army, who is mentioned in French Army Orders. It is explained that on Sept. 15th last his balloon drifted towards the German lines, the cable having been cut by a shell. Lieut. Burburly ripped open the balloon at an altitude of 3,000 ft. before throwing himself out in a parachute, and thus prevented a balloon of a new French type falling into the enemy's hands.

## War Flying in Italy.

In an article in the *Daily Telegraph* descriptive of the visit of British officers to the Italian Front, it is stated:—

"In a country where Nature has provided so many magnificent observation posts with great range of vision, aeroplane observation is not so essential as on the British Front, and naturally the Italians have no need for planes in such great numbers, but they have a sufficient supply of powerful machines, piloted by ex-chauffeurs, and with selected battery officers as observers."

## Flying on the Italian Front.

A LITTLE picture of the difficulties of aerial work on the Italian front is given by the correspondent of the *Secolo*. He says:—"Guns are roaring all around me. Flight squadrons dash through the sky, heedless of fire and shells. Our scouts are tireless. Our anti-aircraft guns fire without intermission. Two Austrian Albatros machines steer for Punta Scobba, and are headed off immediately by two swift Italian planes. Instantly afterwards there is a fight over

Gorizia between one of our Farman machines and an Austrian. Lieut. Ruffo comes to the rescue, swings up 1,000 ft. higher, and drops between both, discharging his machine-gun on the enemy, who is crippled and disappears. When Ruffo lands he is handed a despatch from his comrade, thanking him for his intervention. Another Farman machine is attacked, and Lieut. Ruffo is again on the scene. The fight is over the Carso, and down comes the Austrian. It is the seventh machine hit by Lieut. Ruffo. He hardly has time to breathe, when at dusk he sees three Austrians attacking a lone Farman, and once more he dashes to the rescue. He discharges his machine-gun on the first Austrian machine, which turns a somersault and falls over San Marco. It is Ruffo's eighth victory. From my observation post I witness two other air fights at the same time. Two Austrian machines are driven to shelter behind Monte Kuk, and a third, after a short encounter, vanishes on the horizon. As I write the guns are still blazing away and battles are fought in the air."

## René Doumer Killed.

It is stated that, according to the German publication the *Gazette des Ardennes*, the famous French airman René Doumer, son of the ex-President of the French Chamber, who has been reported missing, was shot down behind the German lines and killed.

## Brazil Buying Seaplanes.

It is announced from New York that the Brazil Government have purchased three twin-engined seaplanes from the Standard Aero Corporation.



# AIRCRAFT AND MOTOR CAR ENGINE DESIGN. CONTRASTED FROM THE STANDPOINT OF A DESIGNER AND MANUFACTURER OF BOTH TYPES.

By LOUIS COATALEN.

(Concluded from page 488.)

## *The Problem of Weight.*

WITH regard to the question of weight, the purpose for which the particular aircraft is required is of prime importance. Obviously, in the case of the engine in a machine designed for short flights only, the consumption of fuel and of lubricant is of less importance than the weight of the engine itself, whereas in the case of the heavier sorts of aircraft with which flights of long duration are obtained and for which great power per engine is needed, the consumption assumes much more importance than the actual weight of the engine. In these latter cases efficiency as regards the weight of the power unit has to be arrived at by taking the weight of the engine complete with the amount of fuel and oil that would be consumed in the course of a flight of, say, five or six hours' duration. Thus for short flights the rotary type of engine generally and the air-cooled varieties are apt to show up to advantage, though in them consumption may be comparatively high, because this is offset by the relative lightness of their starting weight.

From several papers that have been read recently with reference to aircraft engines it is evident that, speaking broadly, as regards weight per horse-power, progress in the design of the ordinary water-cooled type is very marked. To the author's own knowledge, in the brief period of two years there has been obtained with this type a reduction in weight from 4.3 lbs. per horse-power to 2.6 lbs. per horse-power.

It follows that in designing aircraft engines a variety of points have to be considered with extreme care concerning which the builder of an engine for ordinary car service is not forced to take much trouble. This difference is rendered necessary, firstly, by reason of the amount of material employed, and secondly, on account of the comparatively light weight of the aircraft engine complete.

## *Valve Design : The Intermediate Stage.*

The design of the engine head, the cylinders, the valves, and the valve gear is one of the cardinal features of successful aircraft engine production. Car engine design allows of the employment of the L-shaped head, or, in some cases, even of the T-shaped type, though the latter is not used to any great extent to-day for automobile vehicle practice. Undoubtedly the L-shaped head has given excellent results in aircraft engine practice in the past, but the author prefers to consider that such examples really represent an intermediate stage in evolution, and that they stand rather for modified or adapted car engine design than for aircraft engine design proper. In point of fact, high efficiency is got with this type of head only by the use of a special design of valve cap that makes provision for the maximum surface of the engine head being served with water by the cooling system. In other words, you employ a form of duplicated valve cap, the removal of the upper and outer member of which reveals a space for water to circulate beneath it when the engine is working. At the bottom of that water is the valve cap proper. Further, to get the best results, it is needful to machine as much of the surface of this transition type of engine as possible.

## *The Number of Valves per Cylinder.*

For standard car work one exhaust and one inlet valve per cylinder have sufficed for general practice to date, whereas present-day demands on aircraft engine designers are so great that any attempt to attain the requisite degree of efficiency by further exploiting such a scheme of design would lead inevitably to failure. The necessity for running aircraft engines for long spells at either the maximum or a very high output without impairing the efficiency of the machine by distortion or pitting of the valves, which assuredly would occur with the ordinary design employed for car service, and so forth, has compelled the devotion of much thought and a wealth of experiment to the problem, as a result of which it appears to be accepted as established that the multiple valve system is a necessity.

In this connection, to achieve maximum output, the author favours two exhaust valves per cylinder and two inlets.

The horse-power obtained by engines designed on this principle and now standardised would appear to justify this conclusion. For example, a six-cylinder engine embodying this feature of valve design and having a cylinder bore of 81½ mm. with a piston travel of 156 mm., develops 153 h.p. at 3,000 crankshaft revolutions a minute. That is equivalent

to a mean effective pressure of 134 lbs. per square inch. At 2,000 crankshaft revolutions a minute it represents a duty of 21 h.p. per litre capacity.

Among the advantages of the four valves per cylinder scheme are that a good shape of engine head is obtainable with it as well as the best sparking plug position, because that is in the centre of the head in a vertical position. The inclination of the valves necessary for putting them into place allows of ample water-jacket space being provided round each valve and at the base of the sparking plug.

Judged by achievement to date, any other combination of valves per cylinder will not give quite the same degree of efficiency. Take such variants as three valves per cylinder on the principle of two exhaust and one inlet valve. While giving perhaps a better-shaped, because circular, head that can be machined practically all over, this combination practically precludes any other sparking plug position than in the side of the barrel. For obvious reasons, such an arrangement has many disadvantages. Nevertheless, three valves per cylinder scheme gives quite notably good results when exploited in certain ways and for certain special purposes. This may be judged from the fact that the diameter of the inlet valve can be made large enough to-day to give a very high h.p. per litre capacity at 2,000 crankshaft revolutions a minute without involving serious trouble, such as would rise from heat effects, and so forth.

The use of more than four valves per cylinder is undesirable. It seems hardly possible to place them efficiently, leaving an even jacket all round each valve, without the employment of very complicated gear. We have an example of this in the Maybach engine, which has three exhaust and two inlet valves per cylinder. In this scheme little water space is provided between the valve seats, while the sparking plug is, besides, set horizontally in the side of the cylinder barrel.

Undoubtedly in any type of engine it is a gain when the surface of cylinder head can be machined. This is not possible, however, with the four valves per cylinder design. Hence in that case a compromise is achieved by making the surface as small as possible and by finishing it as much as possible by hand with files, scrapers, and so on.

## *The Matter of Material.*

In regard to the material of which the cylinders are fashioned, a tribute is due to the metallurgists and manufacturers on account of the great improvement in the cast iron available for cylinders of recent years, the very high tensile and good ductility qualities of it being particularly notable.

Of course, the advent of aluminium alloy as a material for cylinder castings marks an important stage in the advance of aircraft engine design and production, the rate of progress obtainable by the designer being determined primarily and always by the materials that are available to him. A series of experiments carried out by the author over a period of more than 12 months has proved the superiority of aluminium alloy for this work. It has established the fact that it can give completely satisfactory results when the precisely right alloy is handled with knowledge and is employed on tested designs. Thus a 12-cylinder aircraft engine of 92 mm. bore and 135 mm. piston travel has run at full power for 100 hours without an involuntary stop or untoward incident, otherwise with complete satisfaction.

With that sort of confidence which is founded on reason, as the result of cumulative experience on the one hand and further research on the other, particularly with a view to rendering these special alloys capable of being cast easily in the factory, we may look for both speedy and consistent improvement in those varieties that will be available for this highly specialised work. Though we are merely on the threshold of realising the possibilities of aluminium alloys for cylinder castings, it cannot be doubted that within a brief period they will be recognised as the standard materials for this work, cast iron being discarded in favour of them.

## *Progress in Castings and Alloys.*

The importance of the matter is realised by the aluminium founders of the country. It is encouraging to note the relatively great amount of enterprise being displayed by them in this connection. At the present time the more important aspects of the case embrace the effect of heat on the strength of the given alloy as well as the coefficient of expansion of it.



In the manufacture of aircraft engines more and more use is being made of aluminium alloys of varied analyses, each to suit some particular condition of work. With a continuance of advance in knowledge of heat treatment, and so forth, there is no gainsaying that this material will be employed for aircraft engine construction to a greater and yet more great extent.

#### *Aluminium Alloy Pistons.*

Under this head it falls to be observed that for about two years the author has standardised aluminium alloy pistons with excellent results. Even when they have been made with a green sand core no trouble can be said to have been experienced with them. A point to note, however, is that the greater clearance needed when the aluminium alloy piston is cold represents a disadvantage in comparison with cast-iron pistons, and which has not yet been overcome.

#### *Special Alloys in Place of Gunmetal for Oil Pump.*

Another special alloy is being used in place of gunmetal for the construction of the oil pump employed for the forced feed lubricating system. These details are of the gear-wheel type. As regards both strength and bearing qualities the alloy employed has proved to the full as satisfactory as the gunmetal used formerly.

#### *Problems Presented by New Materials.*

Before quitting the subject of materials in general, at this juncture it will be convenient to pass the general situation in rapid review. Manufacturers have been called on to make immense efforts in the matter of supplying a wide variety of materials for multi-cylinder aircraft engines. They have met and mastered right ably the usual sequence of difficulties that materialise whenever man attempts to break fresh ground. In particular, the high-tensile steel stamping now being supplied, for instance, for a six-throw crankshaft for a 500 h.p. aircraft engine, is a splendid example of the steelmakers' craft to-day. There would have been no call for it had not the advent of war made it necessary on a sudden for us to standardise in these islands aircraft engines of high output. Of course, the necessity for using unprecedentedly high-class materials for these constructions has presented alike steel makers and alloy producers, as well as the engine maker's machine shops, with a series of fresh problems which have had to be overcome detail by detail before it has been possible to obtain that degree of success which is necessary ere any given product can be regarded as a practical proposition.

Briefly, there has had to be an all-round improvement in method; more scientific control has had to be exercised and procedure elaborated; while, of course, the last link with rule of thumb method has been broken in our factories by the coming of the standardised aircraft engine or proportionately great power output per unit. Obviously, there has been a call for devoting the greatest attention to detail, since it will not suffice merely to employ more expensive workmanship and higher grade materials. In regard both to design and to procedure, each part must be accorded, besides, greater attention to detail than any that has sufficed for car engine design and production to date. In what direction this extra study is needed is discovered, of course, by the laborious process of experiment. After that knowledge has been attained, when it comes to standardising practice in the shops, very special attention has to be given to avoid points likely to start flaws. At this stage these are a prolific source of trouble in the production of aircraft engines. Each man has to be trained to give the correct proportion of attention to the various details of his job; therefore a more highly-skilled class of labour is needed. Your individual worker must know precisely what function his particular task and the part which he is engaged in fashioning plays in the scheme of the complete and, necessarily, at present somewhat complicated aircraft engine. Though only a matter of lightening, such details as boring parts, with which the car engine builder is not concerned, have to receive more than ordinary intelligent and conscientious attention during manufacture.

#### *Connecting Rod Forms.*

Of course, both the radial and the V-type aircraft engine have introduced problems of design, the solution of which does not appear to be unanimous yet. In these varieties of engine design you have more than one piston attached to each crankpin. The diversity of opinion concerns the means by which this is done. Naturally the design of eight and of 12-cylinder standard engines for car service, such as our American friends are producing in large quantities, does not call for the same amount of care in this regard that is essential in the case of the more heavily loaded aircraft engine. The

original form was that in which the end of the subsidiary connecting rod is mounted on the outside of the main connecting rod. This, however, makes relatively a very heavy big end not suitable for engines from which is demanded the high duty necessary for aircraft service, as the wear of the big end is controlled by its weight and oil pressure.

A lighter construction is achieved by the link-rod method, wherein the subsidiary member is attached to the main one by a pin placed as near the centre of the crankpin as possible. This arrangement has the additional advantage of rendering is considerably simpler to take up any wear in the big end bearings. For obvious reasons, in the former type that operation is not a very easy one. The latter type, however, introduces a further problem. Owing to the centres of the bottom pins of the subsidiary rods not being coincident with the centres of the main pins, the movement of them is along an elliptical path in contradistinction to that of the crankpin, which, of course, is circular. The ellipse has the effect of altering the stroke of the piston attached to the subsidiary rod. The extent of the variation depends on the angular position of this pin with the centre line of the main connecting rod, the distance from the main pin to the rod pin remaining constant.

#### *The Lesser of Two Evils.*

It will be readily appreciated that the length of the piston travel can be corrected by tilting the axis of the ellipse in such a manner as to give the precise stroke desired. Owing to its change of velocity, also to its greater stress on the main rod due to the reversal of that rod during the firing stroke, this would have the further effect of altering the acceleration of the piston attached to the link rod. In going into this question the author came to the conclusion that the alteration of the stroke was the lesser of two evils.

The design adopted in certain radial engines, in which gear-wheels are used to maintain the correct position of the link-rod pin, is a very clever method of overcoming these difficulties. Nevertheless, it makes for relatively heavy construction and tends to provide a further cause of mechanical failure.

In the case of the three-row 18-cylinder 500 h.p. Sunbeam-Coatalen aircraft engine, the design of connecting rod arrangement in regard to the link pin details is such that the centre row of pistons that are attached to the main rod of each series have a travel of 160 mm., while each of the pistons of the two side rows of cylinders has a stroke of 168 mm.

As it is essential to employ as light a connecting rod arrangement as possible, the question of loads on the bearings becomes of great importance.

Despite the fact that one engine of great power has been designed with balance weights and has certainly given satisfactory results as standardised, and that, of course, these can be used in car practice, nevertheless such accessories are practically precluded in the case of the latter-day aircraft engine on consideration of the weight per horse-power of the given engine.

#### *Lubrication.*

As has been indicated, lubrication is prominent among the matters that illustrate the difference between car and aircraft engine design and practice. While everything possible is done to reduce the bearing pressure in the aircraft engine, nevertheless in practice it is found that the best design is one in which less bearing surface is allowed than obtains in the case of the car engine. This is rendered practicable in the aircraft engine by giving more careful consideration to the problem of lubrication. Thus a pressure in the oil circuit up to 100 lbs. to the square inch is being used. This ensures an excellent condition of bearings, while the design of the oilways in the bearings themselves is such as to prevent excess of lubricant getting to the pistons.

Because an aircraft engine has to carry its supplies of lubricant aboard the machine, obviously it is only less desirable to ship an excessive amount of oil for any given flight than it is to carry too little. Moreover, the fact that the engine bearing pressure is much higher than in motor-car practice, and as much more heat is generated and has to be absorbed by the film of oil on which the lubricated surfaces are floated, renders it impossible to carry the oil in the base-chamber, as in ordinary motor-car engine practice. In aircraft engine design you aim at achieving the maximum economy of lubricant consumption in combination with maintaining effective pressure in the system by preventing the oil becoming too hot and thereby losing its viscosity. Therefore you design an aircraft engine with what is styled a dry base-chamber, placing the oil supply in a tank set somewhere else in the machine, probably in the slipstream of the propeller, so that it may be exposed to the maximum draught and its contents cooled as rapidly as possible, to be served again to the engine



by the intake pump in connection with the pressure system. The relief valve returns all excess oil to the tank and the expelling pump at the bottom of the base-chamber withdraws all the lubricant that, having escaped through the connecting rods and served the details that are oiled by the splash system, returns as filtered residue to the tank, where it is cooled as quickly as possible, and therefore made ready to be passed into the engine system again. Experiment has proved that for a long run under full load it is necessary to force the oil through some sort of cooler placed in the air-stream in a similar way to the radiator. Likewise the design of base-chamber must be such as to act as a cooler of sorts for the oil passing down from the crankshaft and other details to the sump. Of course, the high pressure to which reference has been made is needed in connection with the main bearings, the crankshaft, and the connecting rods only. In this regard a great advance has been made recently by providing a supplementary pump of small capacity which serves to lubricate the minor parts of the engine that do not need high pressure. This ensures that these minor parts get each a proper proportion of lubricant without supplying it at the possible expense of the main bearings and without receiving an excess supply which might make a dirty engine.

## Points about Cooling.

From lubrication we pass to its obvious corollary, cooling. Considerable divergence of opinion still obtains among engine builders and radiator makers concerning water-cooling. The author is of opinion that, because increased flow of water would allow of the employment of a smaller radiator surface, that line of development is likely to be considered in the near future.

Another important matter concerns the rendering adjustable of the cooling capacity, or the surface, to suit variations of climatic conditions and of altitude. Assuredly, this is highly desirable. The conditions under which aircraft are being used to-day renders such a development well-nigh imperative. The use of radiators of relatively less size, such as is to be expected from speeding up the flow of water, should afford a notable advantage in this particular connection.

It is to note that air-cooling is coming into favour increasingly. The introduction of aluminium alloy in the manufacture of the cylinders has exercised a marked effect in regard to this tendency. It would appear, however, that to date relatively very little has been done with multiple valves as applied to air-cooled engines. Yet in the matter of the advantages of employing multiple valves to the number of four per cylinder it would seem that the gains of this system as applied to water-cooled engines should obtain equally in the case of the air-cooled varieties. Further, the small valve is likely to give more satisfaction in air-cooled than in water-cooled engines by reason of the time factor in the conductivity of the heat from the individual valve to the adjacent parts of the cylinder. For these reasons, among others, in the near future air-cooled engines of larger power may be expected to materialise. Certainly this type is very promising.

## Carburation at the Cross Roads.

As applied to aircraft engines, the proposition of carburation stands to-day somewhat on a basis of compromise. For this reason experiments now being carried out are directed towards obtaining more efficient and economical carburation. The tests made on Sunbeam-Coatalen aircraft engines at the manufacturers' works at Wolverhampton have shown a petrol consumption of .52 pints per horse-power per hour, coupled with an oil consumption of .022 pints per horse-power per hour. It will be readily agreed that this stands for a distinct advance on consumption by engines using ordinary type carburettors so recently as at the beginning of the war.

Nevertheless, there is room for a deal of improvement yet. Perhaps this is not so much from the maker's point of view as from the pilot's. One refers more particularly to the supply of petrol to the carburettor itself, for instance, when the aircraft is rising rapidly or stalling. In the case of military aircraft, particularly, there arises the problem of carburation, while the attitude of the engine is being varied in all manner of directions owing to the manoeuvring necessary while fighting an enemy.

## Anticipated Great Alterations in Design.

When this war began there was relatively little fighting in the air, and the average flying was done at anything from 4,000 to 6,000 ft. To-day our airmen rarely go over the lines at less than 16,000 ft., and fighting has taken place certainly at altitudes of 21,000 and 22,000 ft. Accordingly it will be realised that at the outset of the campaign the problem of altitude was not thrust to such an extent on the attention of

the designer and the manufacturer because such modest heights were deemed sufficient for aerial reconnaissance and other work, whereas in the interval it has become imperative to navigate the air at such vastly increased heights that the difference in atmospheric pressure can be ignored no longer for the sufficient reason that the altitudes in question could neither be attained nor maintained if the problems presented had not been solved, at least in part, already. They concern both carburation and engine compression, as well as the matter of cooling. As to carburation, the influence of altitude is quite the most important matter now engaging the attention of designers.

## Forced Induction and Increased Compression.

In dealing with the situation the correct line of attack would seem to lie in the direction of forced induction, though under present conditions perhaps it were unwise to state the manner in which experiments are being carried out towards this end. Suffice it that the problem is abundantly obvious and that great alterations in design are to be expected. Doubtless they will mark yet another point of very great divergence of design from that employed for engines for car service. It is beyond dispute that in the near future the two types must become more and more pronouncedly contrasted.

The alleged method of increased compression exploited for Zeppelin service as a means of tackling this problem is peculiarly suitable for airships, owing to it not being necessary for those craft to climb by mere engine power, also to the fact that a major part of their work is done at high altitude. It is possible that the engines in which small change in atmospheric pressure is allowed for are used entirely for work at high altitudes, and have a much higher compression than those which are employed for manoeuvring Zeppelins near the ground.

Of course this question of compression is interconnected with the problem of carburation; hence we must also regard altitude as a governing factor in the design of the latter-day aircraft engine. In the last few years considerable advance has been made in the degree of compression standardised successfully. Thus, engines with a compression ratio as high as 6 to 1 are running satisfactorily at sea-level to-day. That, however, has been rendered possible only by evolving such a combination of features as valves of suitable design, diameters and openings, and by going very scientifically into the matter of cylinder head design.

## Three Years' Progress at a Glance.

Assuredly it is interesting to compare present-day achievement with results of, say, three years ago, as instance those obtained at the Naval and Military Aeroplane Engine Competition in 1914. As a result it will be found that then the use of aluminium was practically confined to the crankcase only. Its application to the construction of pistons and other small parts of the aircraft engine was not known. Further, we find that the maximum mean effective pressure was approximately 106.5 lbs. per square inch, and that the average fuel consumption was .6 pint per horse-power per hour. The weight of the engine with fuel for a run of six hours' duration varied from 9.55 in the case of the rotary air-cooled variety to 11.27 in that of the vertical water-cooled type.

By contrast, to-day the mean effective pressure standardised has been increased to 135 lbs. per square inch, measured from the brake horse-power, and, in some cases, actually through the reduction gear. At the same time fuel consumption has been reduced to .52 pint per horse-power per hour, while the weight of the V-type water-cooled engine has been brought down to 6 lbs. per horse-power per hour with fuel and oil for a six hours' effort, all of which I hold to represent a notable rate of progress achieved in the brief period of less than three years.

As regards the heart of the aeroplane—its power plant—there is no sound reason for adhering to the general attitude of the British public, which is to decry home achievement, praise all foreign endeavour, and, notably, to set German effort on a pedestal as something unapproachable. How erroneous is that idea when applied to the aircraft engine proposition you may gather from a single instance. Take the latest 6-cylinder water-cooled German Mercedes aircraft engine, of the four valves per cylinder type. Without radiator and water that weighs 34 lbs. per horse-power. Now in this country there are designed and produced water-cooled engines which, without water and radiator, weigh 2.6 lbs. per horse-power, nearly 1 lb. per horse-power lighter than the best-known German performance.

## Installation of Aircraft Engines.

I feel that the present occasion is opportune for touching briefly on the installation of engines in aircraft. As you will



be aware, a very high percentage of engine trouble on active service is due to failure of some detail or other in connection with the installation. Therefore it cannot be too widely known that all petrol piping should be insulated as absolutely as possible from the effects of vibration. The first rule should be to support all such piping throughout its length. Take, for example, the pipes as they pass along the *fuselage* details between the engine and the tank. It should be impossible to shake these by the hand at any point. If on going over them you can make a slight movement, there you should provide additional support. Again, wherever there is a change of unit, as, for example, where the pipe is taken from the *fuselage* to the engine bearer, there that pipe should be cut. Further, you should always provide steel liners for the nipple. These liners should be proportionately very long so that the Durit will be held on the nipple itself. Reliability in service depends enormously on the giving of due attention to little details of this character, which are so obvious that it seems almost superfluous to mention the matter. Indeed, it would be, were it not for the fact that these first principles of aircraft engine installation, if I might so call them, are neither generally understood nor practised yet.

#### Method of Rating.

From the inception of the movement several methods have been proposed for rating petrol engines. At the stage at which we have now arrived in constructing power plant for aircraft service some figure seems to be needed which will

give a notion of the efficiency, or horse-power output, of an engine in relation to its size. To-day the mean pressure is used often for this purpose; but in my view that is neither convenient nor can it be arrived at easily.

For this reason I wish to propose that the horse-power per unit capacity obtained from any given engine be taken as the standard for preparing the different "duties" of engines. Of course the figure obtained is proportionate to the mean effective pressure, but doubtless it will be agreed that it is more convenient.

The capacity taken would be the capacity per cylinder multiplied by the number of cylinders and by the number of complete cycles per minute, but to serve the aim in view the horse-power per litre engine capacity per 1,000 cycles, otherwise per 2,000 crankshaft r.p.m. is proposed.

In his Presidential Address to the members of the Institution of Automobile Engineers in October, 1916, Mr. Legros gave some very interesting figures comparing petrol engines by means of the equivalent radius or torque of the crankshaft divided by the weight of the given engine. In connection with the aircraft engines cited, I have reduced these figures, and find the results vary in the range of 18 to 21 h.p. per litre capacity at 2,000 crankshaft r.p.m. I deem the latter figure the maximum likely to be obtained at sea-level with water-cooling by the present design of engine without the use of super-charging, measuring the duty at the propeller.



#### The Destruction of "L. 22."

IN the Danish *Berlingske Tidende* it is stated that the "L. 22" was destroyed by gun fire. Eye-witnesses affirm that the Zeppelin was sailing on a tour of inspection along the coast a good way out to sea, at a considerable height. She could be seen very plainly from as far inland as Hjerting and Skallinger, but it was impossible to see the pursuing British ships, even from the shore. Suddenly the sound of sharp reports was heard, and the Zeppelin rose. Once more the guns rattled, and again the Zeppelin tried by rising to a greater altitude to get out of reach of the British guns. She did not get very much higher before the guns thundered out a third time, and then the airship sank, at first slowly, then more quickly, disappearing finally like a distant flash.

#### Zeppelins with German Baltic Fleet.

MESSAGES from Karlskrona, the Swedish naval port, report that on May 20th 30 German warships, including auxiliaries and trawlers, convoyed by two airships, were sighted off Utklippor, steaming north.

#### German Aeroplane Factory Burnt.

ACCORDING to the *Handelsblad*, a big aeroplane factory at Koepenick, near Berlin, has been completely burnt down.

#### Aeroplane Mail in Italy.

ONE of the aeroplane mail services already mentioned in "FLIGHT" has now actually been accomplished. On Tuesday, the first trial was made of the aerial postal service between Turin and Rome (a distance in a straight line of 330 miles). An aeroplane left Turin at 11.15 a.m. carrying mailbags weighing 440 lb., 200 copies of Turin newspapers, and a message from the city of Turin to Signor Boselli, the Premier. It arrived in Rome at 3.30 p.m. The weather

was unfavourable between Turin and Leghorn, but improved from thence onwards. During the journey an average height of 9,000 ft. was maintained.

#### A 12-Passenger Aerial Ferry.

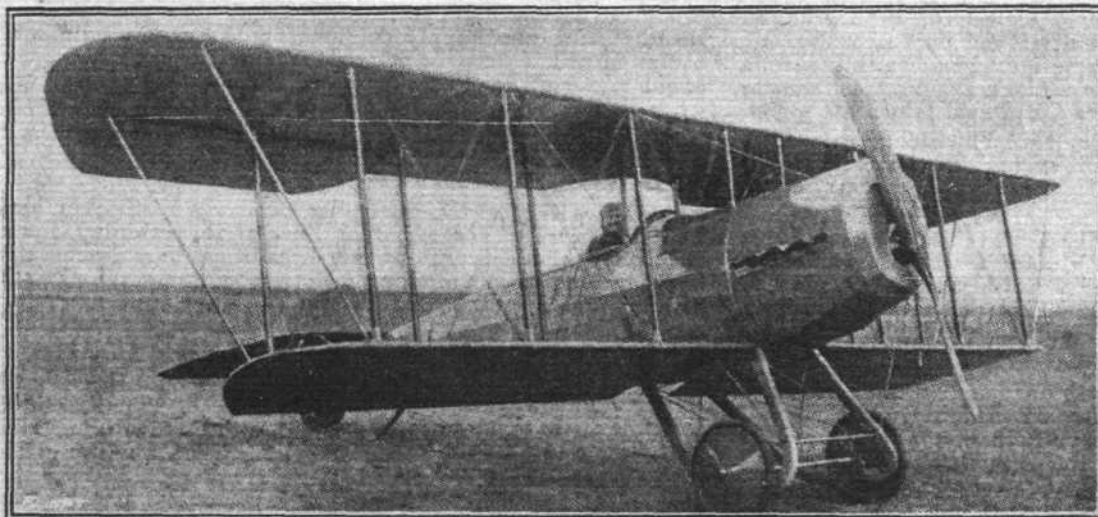
THE Benoist Aeroplane Co., of Ohio, U.S.A., are building a large flying boat to be used for passenger service between Sandusky, and Put-in-bay. It will be equipped with a 350 h.p., 12-cylinder Roberts engine, and will carry 12 passengers. One round trip per day is to be made between the above-mentioned places, and one or two round trips a week between Sandusky and Detroit. The same firm is getting out the designs for what will probably be the largest flying boat so far built. This aerial cruiser will carry 25 passengers, and will be fitted with two 350 h.p. Roberts motors. These latter, contrary to usual practice, will be located in the bow of the boat.

#### Aviator Rescued by Boys.

WHILE a number of aeroplanes were practising near Erith on Saturday, something went wrong with one, and it fell into the river, narrowly missing a wharf in its descent. Two small boys in a boat rescued and safely landed the pilot of the machine, which was later towed to shore.

#### The Bombing of a Dutch Town.

At the request of the British Government, an officer has been given permission to examine the fragments of the bombs which were dropped recently on Zierikzee (Dutch Flanders) by an aeroplane of unknown nationality. The officer arrived at The Hague on Saturday. The *Flushing correspondent of the Telegraaf* states that as the result of further investigation at Zierikzee, it is established that the aeroplane which dropped bombs used a searchlight.



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The new Marlin

scout, which has

been constructed

in Texas, its speed

being put at 100

miles an hour.

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# AIRCRAFT WORK AT THE FRONT.

## OFFICIAL INFORMATION.

### British.

*General Headquarters, May 11th.*

"Activity in the air continued yesterday. Three German aeroplanes were brought down in air fighting, and three others were driven down out of control. Two of our machines are missing."

*War Office, May 11th.*

"Salonica.—Our aeroplanes have carried out four successful bombing raids, and have dropped a large quantity of explosives on the enemy's dug-outs, dumps and transport."

*General Headquarters, May 12th.*

"In air fighting yesterday seven German aeroplanes were destroyed and five others were driven down out of control. Four of our aeroplanes are missing."

*General Headquarters, May 13th.*

"Five German aeroplanes were brought down in air fighting yesterday, and five others were driven down out of control. One other hostile machine was shot down in our lines by our anti-aircraft guns. Six of our aeroplanes are missing."

*General Headquarters, May 14th.*

"In air fighting yesterday six German aeroplanes were brought down, and two other hostile machines were driven down out of control. Three of our aeroplanes are missing."

*General Headquarters, May 15th.*

"Two German aeroplanes were brought down in air fighting yesterday, and one other hostile machine was driven down out of control. Two of our aeroplanes are missing."

*General Headquarters, May 16th.*

"One German aeroplane was driven down out of control yesterday. One of our machines is missing."

*War Office, May 16th.*

"Salonica.—The Royal Naval Air Service have carried out two successful bombing raids on the camps in rear of the enemy's line."

*War Office, May 19th.*

"Salonica.—The R.N.A.S. have successfully bombed the aerodrome and camp at Doiran."

*General Headquarters, May 19th.*

"One German aeroplane was brought down in air fighting yesterday, and another was shot down by gunfire from the ground. Two hostile observation balloons were also destroyed. Five of our aeroplanes are missing."

*General Headquarters, May 20th.*

"Three German aeroplanes were brought down yesterday in air fighting, one of which landed in our lines. Five other hostile machines were driven down out of control, and one German observation balloon was destroyed. Four of our aeroplanes are missing."

### French.

*Paris, May 11th.*

"Yesterday our pilots brought down five enemy aeroplanes in aerial fights. Four other German machines were forced to land, seriously damaged."

*Paris, May 12th.*

"Yesterday our chasing aeroplanes took part in numerous fights, in the course of which seven German aeroplanes, brought down by our pilots, were completely destroyed; seven others were seriously damaged and fell wrecked in their lines."

*Paris, May 17th.*

"In the period between May 8th and 16th Sub-Lieut. Nougesser brought down three German aeroplanes, bringing to 27 the number of machines destroyed up to the present by this officer. Sub-Lieut. Dorme brought down in the same period his twenty-third adversary, Lieut. Deullin his fifteenth, Sub-Lieut. Chaput his eleventh, Adjutant Jailler his ninth, and Adjutant Cazales his eighth. Finally Capt. Auger brought up to five the number of enemy aeroplanes for which he has accounted."

*Paris, May 19th.*

"Lieut. de la Tour has up to the present brought down nine German aeroplanes and Adjutant Douchy seven."

*Paris, May 20th.*

"Salonica.—British airmen bombed enemy camps and depôts in the region of Drama and near Doiran."

*Paris, May 21st.*

"During the night of the 19th our bombarding aeroplanes dropped 2,200 kilos. of explosives on the railway stations and bivouacs in the region of Epoye-Bétheniville (north-east of Rheims). During the day of the 20th the aviation ground of Habsheim, the bivouacs of Pont Faverger and Bétheniville also received numerous projectiles."

"On the same day two German aeroplanes were brought

down by our pilots, and a third was accounted for by the fire of our anti-aircraft guns. Three other enemy machines were compelled to land badly damaged."

### Russian.

*Petrograd, May 13th.*

"A German aeroplane landed in the region of Nalibok, in the direction of Novogradok, and was captured by us. In the region of Monasterjiska one of our Ilia Murometz aeroplanes, owing to an unknown cause, fell from a height of 3,000 metres. The commander, Lieut. Lavroff, and a crew of four officers and one private, perished. In the region of Stanislavoff one of our aeroplanes fell. The pilots, Katchioni and Pesino, perished."

*Petrograd, May 14th.*

"In the direction of Kovel, near Rudka-Sitovicheska, our artillery brought down a German aeroplane, which fell within the enemy's lines."

*Petrograd, May 16th.*

"Our air pilot Lieut. Golcher brought down a German aeroplane, which fell within the enemy's lines, near the hamlet of Bolshovtso. Our air pilot, Vrikov, threw bombs upon Burshtyn."

*Petrograd, May 20th.*

"After a fierce combat with a German Albatros one of our machines fell in the region west of Dvinsk. The machine was burned, and the aviator, Ensign Lintoff, and the observer, Staff-Capt. Stepanenko, perished."

### Italian.

*Rome, May 11th.*

"On the night of the 10th hostile aircraft dropped bombs in the Gorizia area without doing any damage. Our seaplanes bombed the aviation base of Prosecco, north of Trieste. Yesterday one of our squadrons bombed the railway works of Rifemberga with good results and returned safely. One enemy machine was brought down in an air fight."

*Rome, May 12th.*

"Enemy aircraft on the night of the 11th bombed Punta Sdobba and some other places on the Lower Isonzo, causing one casualty. One of our squadrons bombed the railway works at St. Daniele, in the Branizza Valley (Frigido). One of our Caproni machines reached Pola, and caused a fire to break out in the arsenal. An enemy machine succeeded in reaching Brescia, but did not drop any bombs."

*Rome, May 13th.*

"Hostile aircraft dropped bombs on Isola Morosini and other localities on the Lower Isonzo, killing a civilian. Our seaplanes renewed the bombardment of the aviation base of Prosecco, north of Trieste. During an air fight above Gorizia one enemy machine was brought down."

*Rome, May 14th.*

"Enemy aeroplanes made repeated attempts to reconnoitre in the Sugana valley, but were hindered by our air patrols."

"Aerial activity also increased. A hostile squadron dropped bombs in the Aquileja area, damaging the basilica and archaeological museum. In a brilliant engagement on the Middle Isonzo two enemy machines were brought down by our airmen."

*Rome, May 15th.*

"Aircraft activity was also very considerable. During the morning our machines bombed enemy hutments in the neighbourhood of Chiapovano. In the afternoon a strong squadron of our aeroplanes dropped about 200 bombs on encampments and supply columns on the enemy's lines of communication east of Gorizia. Our airmen, flying at about 500 metres (1,600 ft.) from the ground, opened fire with their machine guns on enemy troops which were there assembled, and dispersed them. All our machines returned safely."

*Rome, May 16th.*

"On the left front down to the sea lively artillery actions took place. The enemy's rear lines were yesterday again effectively bombed by our air squadrons, and during the night by one of our airships. Notwithstanding the attacks of numerous enemy machines and the fire of his batteries, we did not suffer any loss."

*Rome, May 17th.*

"Last night one of our airships made a raid in the Frigido Valley. Favoured by the clouds our daring airmen descended to a low altitude, and dropped bombs and fired with machine guns upon the enemy's cantonments. The airship afterwards returned safely to her base."

*Rome, May 18th.*

"During last night one of our airships, under cover of



clouds, was able to reach the enemy's rear lines east of Gorizia without being observed, and bombed his encampments, returning safely."

*Rome, May 19th.*

"Aerial activity continued to be intense. Our squadrons dropped bombs on encampments east of Canale and in the Gargaro valley, returning safely to their bases. Two enemy machines were brought down."

"Italian seaplanes successfully dropped bombs on the military organisations on the Isle of Lagosta on Thursday, and returned undamaged to their base."

*Rome, May 20th.*

"An enemy machine was brought down in an air fight above Feltre."

#### Serbian.

*Salonica, May 11th.*

"Our airmen bombarded the enemy camps at Kravitza and near Staravina."

*Salonica, May 14th.*

"Our aviators forced an enemy aeroplane to fall headlong, and dropped 24 bombs on enemy bivouacs near Konopishte and Mrezintze; good results were observed."

*Salonica, May 19th.*

"Our aviators dropped 54 bombs in the region of Konopishte and Rozden."

#### German.

*Berlin, May 11th.*

"In aerial battles and by our anti-aircraft guns 18 enemy aeroplanes and one captive balloon were brought down on May 10th."

"Lieut. Baron von Richthofen conquered his twenty-second and Lieut. Gontermann his twentieth opponent."

*Berlin, May 12th.*

"Fifteen enemy aeroplanes were brought down yesterday."

*Berlin, May 13th.*

"On May 12th the enemy lost 14 aeroplanes in aerial encounters and three aeroplanes which were shot down to the earth by our anti-aircraft fire. A French airman was compelled to make a forced descent behind our lines."

*Berlin, May 15th.*

"In aerial fighting six enemy aeroplanes fell behind the German lines, whilst another made a forced landing."

*Berlin, May 19th.*

"With unfavourable weather the aerial activity has been small during the past few days. We shot down 10 enemy aeroplanes yesterday."

#### Austrian.

*Vienna, May 16th.*

"In the region of Fajti Hrib the enemy in the morning again fruitlessly attacked, but his thrust was not repeated, as our artillery fire, effectively supported by our airmen, kept the Italian attacking columns to their trenches."

"Two Italian Nieuport aeroplanes were brought down by our airmen."

*Vienna, May 19th.*

"Our aviators shot down in an air fight two enemy aeroplanes, and a third was brought down by rifle fire near Vertoiba."

## FATAL ACCIDENTS.

WHILE flying in Ayrshire on May 1st a machine crashed to the ground owing to the engine stopping and burst into flames. The passenger, 2nd Lieut. James Stevenson, R.F.C., was fatally injured.

At the inquest on May 3rd on Flight-Sergt. W. E. M. Stedolph, R.F.C., the evidence showed that his machine, after descending normally from 2,500 ft. to 150 ft., suddenly turned and nose-dived to the ground. A verdict of "Accidental Death" was returned.

An inquest was held in the Lincoln district on May 5th on 2nd Lieut. R. G. Turner, R.F.C., who was fatally injured in an accident on the previous day. According to the evidence the machine commenced to turn without enough bank on. It then turned in a spinning nose-dive, and although deceased twice righted the machine it dived a third time and crashed to the ground. A verdict of "Accidental Death" was returned.

At an inquest on May 14th on Mr. W. Rowland Ding, who was killed at Roundhay on May 12th, the evidence showed that, after climbing to a height of 1,500 ft., the machine banked very considerably and looped the loop twice; then the wings on one side of the machine collapsed. It was stated that the machine was a new one and had been examined by the firm's inspectors earlier in the day. A verdict of "Accidental Death" was returned.

At the inquest on May 15th on Lieut. W. F. Smith, A.I.F., attd. R.F.C., who was fatally injured at Hounslow two days

previously, it was stated that he started off for practice on a fighting machine. He had got up a certain amount of flying speed, but he pulled off before he really got sufficient. He evidently realised his mistake and tried to correct it by putting the nose of the machine down. Next he banked sharply to the left at a height of 40 ft., and at the same time tried to turn and climb. The result was that, through not having a full engine, the machine side-slipped, nose-dived and crashed to the ground. A verdict of "Accidental Death" was returned.

Evidence was given at the inquest on May 15th on Flight-Lieut. L. Morgan, R.N.A.S., and Prob. Flight-Officer R. Seed, who were killed at Edmonton on May 11th, by a brother officer who was flying at the same time. He said he noticed the other machine suddenly appear to collapse and then nose-dive to the ground. A verdict of "Accidental Death" was returned in each case.

While flying on Saturday Lieut. G. A. Nicholson met with a fatal accident through the machine suddenly nose-diving to earth and bursting into flames. Although he was extricated promptly from the smashed aeroplane, life was found to be extinct.

While flying a biplane on Saturday night 2nd Lieut. C. L. Beaumont and Capt. J. F. St. J. Annesley, R.A.M.C., were killed.

Whilst flying between two South Coast towns an aeroplane crashed to the ground. The pilot was killed and the observer injured.

## SIDE-WINDS.

NOTTINGHAM is determined to be famous for other things than lace and its Goose Fair, and is doing all that it can to attract to the neighbourhood those who are contemplating laying down new works, and those aircraft firms who, having outgrown their present accommodation, might well get in touch with the Industrial Development Officer at the Guildhall, Nottingham. A remarkable book has been prepared setting forth the past, present and future of the city and its special advantages as a commercial centre. Not only is Nottingham well situated as regards railway facilities, but it is also connected by waterways with Hull, London, Birmingham, Manchester and Liverpool. There is also a fine tramway service for conveying the workers from the residential to the industrial districts. One claim which will appeal especially to the financial department is that the rates are only 8s. 2d. in the £1, the tramway, electricity and gas undertaking being run at a profit and contributing substantially to the relief of rates. From the point of view of healthy surroundings for workpeople, Nottingham has many advantages. There are ample open spaces with facilities for games, while within a short distance of the city there are plenty of opportunities for enjoying beautiful country. Copies of the handsome and informative book can be obtained

by anyone interested from the Industrial Development Officer as mentioned above.

SHEET metal work for aeroplanes not being the easiest of things to be had at the present time, note should be made of a special offer which will be found set forth on page xxviii. in our advertisement section.

AVIATION will be a cosmopolitan art in the days of peace to come. Siam is quite a likely quarter of the globe where an opening for the use of aeroplanes may be expected to materialise. Therefore anyone interested may like to get into touch with a Bangkok firm of standing well in advance. In this connection Messrs. Barrow, Brown and Co., of Bangkok, advise us that their Mr. E. O'Hara is coming to England, and can be communicated with c/o Messrs. John Birch and Co., Ltd., 2, London Wall Buildings, London, E.C. If it can be arranged Mr. O'Hara will also pay a brief visit to the United States and there can be addressed c/o Messrs. Melchior, Armstrong and Dessau, 116, Broad Street, New York.

AN ingenious idea which should appeal to the flying officer especially is the invention of two practical men, Mr. M. R.



Turnbull, A.F.Ae.S., and Mr. N. A. Feary. It consists of a couple of light nickel-plated metal frames clipped on to note block and made to fit the arm on which they are secured by a couple of elastic bands. By its use the pilot will always have his note block handy and yet he will not have one hand occupied in holding it. Pending arrangements for the fitting being manufactured in large quantities we shall be pleased to pass on any inquiries.



In the latest model of their "R" aeroplane sparking plug, the Forward Motor Co., of Birmingham, have succeeded in still further reducing the overall length. It is now a shade under  $1\frac{1}{2}$  ins., and it is claimed that it is the smallest and lightest sparking plug made for rotary engines. Although it is so small, the plug is very sturdy, and is made so as to give maximum service. As in the previous models of the same type, the body is of steel with a brass bushing for the central electrode, while the insulation is of the best quality mica. As will be seen from our sketch, the plug has two firing points.

**The new Forward plug for aero engines.** BEAUTIFULLY illustrated and excellently arranged is a little brochure which comes from the Curtiss Aeroplane and Motor Corporation, of 17, Surrey Street, London, W.C. 2. Specifications are given of the various types of Curtiss aeroplanes, seaplanes and aeromotors, together with a number of photographic illustrations and one or two pictures in colour. Not the least interesting features of the book are the power curve diagrams of the Curtiss motor and a list of early Curtiss records. It verily contains all about Curtiss's in a—well, little more than a nutshell—for the brochure only measures 4 by 3 ins.

TEST-PILOT SYDNEY PICKLES has not been allowed to keep the soles of his boots pressing Mother Earth instead of the rudder-bar for a very long period, which was a condition we foresaw when he inclined to a little rest from his evolutions above. We understand that he has now joined the Fairey Aviation Co., as Test-Pilot for the machines of that company's own design at the Hamble factory.

## LEGAL INTELLIGENCE.

### Hangars are "Houses."

In the King's Bench Divisional Court on May 11th the Lord Chief Justice and Justices Ridley and Lush gave their decision in the special case of the Brighton-Shoreham Aerodrome v. Dell, which had been submitted by the Shoreham Justices for the consideration of the Court. The point raised was as to the liability of certain hangars to bear a rate of 10s. in the £1 for sea defences levied by the East Lancing Commissioners. It was contended on behalf of the aerodrome company that hangars were houses only liable to a rate of 3s. 4d. in the £. This submission was argued against by the respondents, who urged that a hangar was not a house.

The Lord Chief Justice, in giving judgment, said the difficulty that met one at the outset was that there was no special meaning attributable to the word "house," and certainly they were not entitled to say that it only meant a dwelling-house. In his view they must assume there was no fixed or definite meaning, but they must look to the statute in what sense the word had been used. Looking at the object of the Provisional Order, confirmed by statute, he came to the conclusion that the word "house" meant more than a dwelling-house, but was intended to cover any such permanent structure as could be properly described in ordinary language by using the term "house." Although he had found difficulties in the case, he had come to the conclusion that the better view was that these structures were "houses" within the meaning of the Provisional Order, and should be rated at the lower rating of 3s. 4d. in the £.

Justices Ridley and Lush concurred, and the appeal of the company was accordingly allowed with costs.

### PUBLICATION RECEIVED.

*Air Navigation for Flight Officers.* By Lieut.-Commander A. E. Dixie, R.N. Portsmouth: Gieves Publishing Co., Ltd. London: John Hogg. Price 10s. 6d. net (postage 5d.).

### New Wright Companies.

MR. ORVILLE WRIGHT is actively interested in two new companies which have been formed at Dayton. One is the Dayton Wright Airplane Co., with \$500,000 capital, which will manufacture aeroplanes, while the Wright Field Co. with \$10,000 will conduct an aviation school. The directors of both concerns are Orville Wright, Edward A. Deeds, of the Dayton Engineering Laboratories Co., Charles F. Kettering, Harry E. Talbot and Harry E. Talbot, Jr., the last-named being president.

### Postcards of Aeroplanes.

THE series of picture postcards issued by Messrs. Raphael Tuck and Sons cover a very wide range, and one of the latest additions to their "Oilette" series should not be by any means the least popular. It is a set of six cards illustrating various phases of flying such as banking, &c. Although they are of no particular machine, we must be careful not to let the Germans know anything about our Service machines. The pictures by Mr. G. T. Clarkson, are very well done, and, of course, they are splendidly printed. The set cost sixpence.

### NEW COMPANIES REGISTERED.

**RIVERS ENGINEERING CO., LTD.**—Capital £5,000, in £1 shares. Acquiring business carried on at Cremorne Wharf, Chelsea, S.W., as the Rivers Engineering Co., mechanical, aeronautical and general engineers, &c. First directors: Stanton W. Cole, Moritz Kahn, William Black and Robert O. Williams.

**SIBLEY'S, LTD.**—Capital £10,000, in £1 shares.—Manufacturers of aeroplanes, airships, engines, parts and accessories, &c. First directors: W. G. Scammell, G. W. Sibley and G. W. Boundy.

### IMPORTS AND EXPORTS, 1916-1917.

AEROPLANES, airships, balloons, and parts thereof (not shown separately before 1910). For 1910 and 1911 figures, see "FLIGHT" for January 25th, 1912; for 1912 and 1913, see "FLIGHT" for January 17th, 1914; for 1914, see "FLIGHT" for January 15th, 1915; for 1915, see "FLIGHT" for January 13th, 1916; and for 1916, see "FLIGHT" for January 11th, 1917.

	Imports.		Exports.		Re-Exportation.	
	1916.	1917.	1916.	1917.	1916.	1917.
January ...	1,509	10,842	6,399	67,033	Nil.	Nil.
February ...	6,444	9,479	30,693	26,512	—	6
March ...	3,388	11,158	17,872	58,517	7	—
April ...	3,383	21,141	22,608	21,151	3,783	—
	14,724	52,620	77,572	173,213	3,790	6

### Aeronautical Patents Published.

Applied for in 1915.

Published May 24th, 1917.

17,346. F. H. PAGE. Catch or fastening, suitable for releasing gear for bombs carried by aeroplanes.

Applied for in 1916.

The numbers in brackets are those under which the Specifications are printed and abridged, &c.

Published May 24th, 1917.

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